

VICTOR KRAL

Interviewee: Victor Kral
Interviewed: 1996, 1997
Published: 2004
Interviewer: Victoria Ford
UNOHP Catalog #199

Description

Victor Kral was one of the last of his breed, a true miner in body, mind, and spirit. His mining career spanned from the Great Depression until his death in May 2004. Vic was born in Pasadena, California, to parents who were tailors. As a teenager, he traveled alone to Reno with one small suitcase to live with his half brother. He graduated from Reno High School, then attended the University of Nevada's Mackay School of Mines during the Depression, and like many college students at that time, alternated between work and school. He first took a one-year break between his sophomore and junior years, working in an underground mine at Ruth, Nevada, where he became hooked on mining and changed his major from civil engineering to mining engineering. Between his junior and senior years, the work break lasted longer. He spent five and a half years at various jobs that included road surveying for the Nevada Highway Department and working for the Soil Conservation Service. Vic said that through that work he learned the most about Nevada and its people.

Vic graduated with a bachelor's degree in mining and went directly from Reno to the E.L. Cord cyanide mill located outside Silver Peak, Nevada. His descriptions of the Cord Mill—not only the inner workings and processes of the mill, but the working and living conditions at the mining camp—are a valuable contribution to the knowledge of mining and milling in central Nevada in the 1930s.

After the Cord Mill job and a short stint at mining in northern California, Vic worked for the Department of Education in Carson City. Once again, he traveled around northern Nevada where he taught continuing education classes on mining. When World War II began, he worked as a civilian mining engineer with the war department. Part of his work took him to southern Nevada where he did appraisals on mining claims that were within the boundaries of government land—the area that would be used for military training and bomb testing. One of his accomplishments following the war, for which he felt pride, was writing several works on Nevada mining for the Nevada Bureau of Mines, including Mineral Resources of Nye County, Nevada. Also, while there, he worked with iron ore, a project that eventually led him away from Nevada. He moved his family to the Upper Peninsula of Michigan and accepted a job with the Ford Motor Company, where he worked for fifteen years. He described that as a time when Ford owned many of its manufacturing resources, such as iron ore mines. In later years, however, the Ford Company began changing, so Vic decided to take early retirement to pursue other interests.

From there, Vic worked for the Hanna Mining Company in Maine and Arizona and for the Arizona Department of Mineral Resources. After twenty-one years away, Vic returned to Nevada where he founded a successful consulting firm with Ralph Roberts and Bob Reeves, who were also notable among the Nevada community of mining men.

Vic Kral passed away at the age of ninety-two. Although he no longer went out into the field in his nineties, he was still teaching mining to younger engineers and even to his grandchildren. He created a series of historic mining

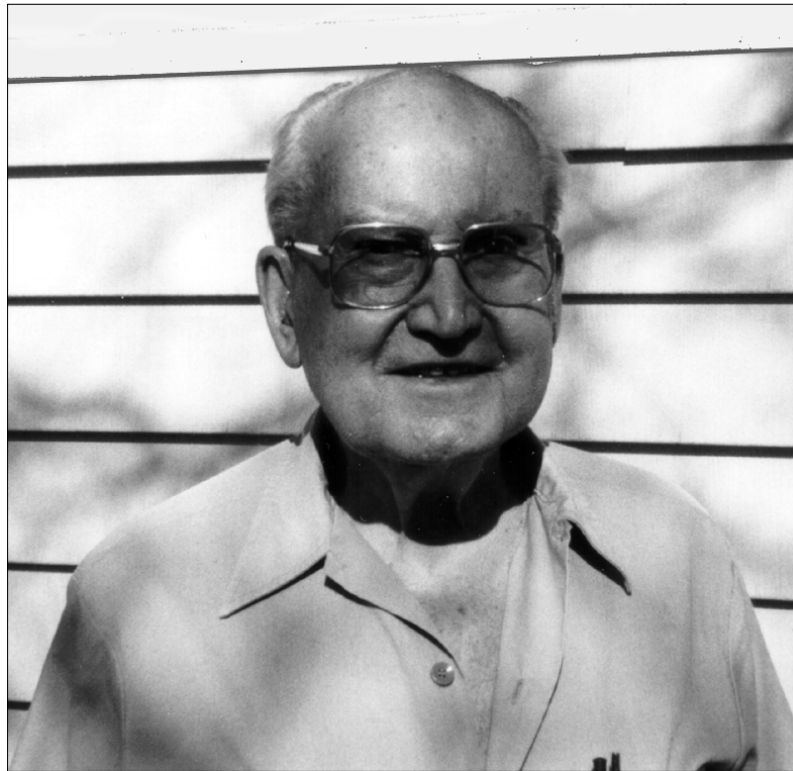
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calendars, advocated for Mackay School of Mines, and collected nearly everything he saw pertaining to mining right up until the time of his death. In addition to being a miner, Vic was also a very kind and caring man who will be greatly missed, as will his enthusiasm for Nevada mining.

Victor Kral was initially interviewed in 1996 by Victoria Ford for an oral history mining project about Silver Peak, Nevada. (See Oral History Nos. 183 and 192.) Then Ms. Ford returned in 1997 to finish the interviews on Mr. Kral's entire mining career. This oral history is the final product.

VICTOR KRAL



Victor Kral
(Photograph by Victoria Ford)

VICTOR KRAL

From oral history interviews
conducted by Victoria Ford

Edited by Kathleen M. Coles

University of Nevada
Oral History Program

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Printed in the United States of America

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PREFACE

SINCE 1965 the University of Nevada Oral History Program (UNOHP) has been collecting eyewitness accounts of Nevada's remembered past. While there is no standard chronicler profile nor rigid approach to interviewing, each oral history plumbs human memory to gain a better understanding of the past. Following the precedent established by Allan Nevins at Columbia University in 1948 (and perpetuated since by academic programs such as ours throughout the English-speaking world), these manuscripts are called oral histories. Some confusion surrounds the meaning of the term. To the extent that these "oral" histories can be read, they are not oral, and while they are useful historical sources, they are not themselves history. Still, custom is a powerful force. Historical and cultural records that originate in tape-recorded interviews are almost uniformly labeled "oral histories," and our program follows that usage.

The transcripts that resulted from Victoria Ford's interviews of Victor Kral have been slightly edited for readability, but the natural episodic structure follows the interview tapes. Amusement or laughter is represented with [laughter] at the end of the sentence; and ellipses are used not to indicate that material has been deleted, but rather to indicate that a statement has been

interrupted or is incomplete . . . or there is a pause for dramatic effect. For readers who are interested in examining the unaltered records, copies of the tape-recorded interviews are available at the UNOHP's reading room on the University of Nevada, Reno campus. While the program can vouch that the statements in this volume were made by Victor Kral and that he has reviewed the transcript, it does not assert that all statements are entirely free of error. As with all oral history projects, Mr. Kral has recorded his *remembered* past, and memory is never flawless. Readers should exercise the same caution used when consulting government records, newspaper accounts, diaries, and other primary sources of historical information.

UNOHP
July 2004

INTRODUCTION

VICTOR KRAL was one of the last of his breed, a true miner in body, mind, and spirit. His mining career spanned from the Great Depression until his death in May 2004.

Although he no longer went out into the field in his nineties, he was still teaching mining to younger engineers and even to his grandchildren. He created a series of historic mining calendars, advocated for Mackay School of Mines, and collected nearly everything he saw pertaining to mining right up until the time of his death.

I first met Vic at his home in Sparks, Nevada, in 1996 while I was working on an oral history project about Silver Peak, Nevada. Through word-of-mouth, I learned that he worked in one of Nevada's first cyanide mills, and he eagerly agreed to tell me about his experience. We held our interviews in his small home office that was crammed full of books and papers, some of it remnants from earlier years and some of it for current projects. Our interviews were lively and filled with information. He loved mining and relished the opportunity to teach a novice. Partly due to his patient teaching and encouragement, the Silver Peak oral history

mining project grew into a statewide project, and I returned in 1997 to finish the interviews on his entire mining career.

Vic was born in Pasadena, California, to parents who were tailors. As a teenager, he traveled alone to Reno with one small suitcase to live with his half brother. He graduated from Reno High School, then attended the University of Nevada's Mackay School of Mines during the Depression, and like many college students at that time, he alternated work and school. He first took a one-year break between his sophomore and junior years, working in an underground mine at Ruth, Nevada. That was where he became hooked on mining and changed his major from civil to mining engineer.

Between his junior and senior years, the work break lasted longer. He spent five and a half years at various jobs that included road surveying for the Nevada Highway Department and working for the Soil Conservation Service. Vic said that through that work he learned the most about Nevada and its people. In addition, he married and started a family, which added to his responsibilities.

Vic graduated with a bachelor's degree in mining and went directly from Reno to the E.L. Cord cyanide mill located outside of Silver Peak, Nevada. His descriptions of the Cord Mill—not only the inner workings and processes of the mill, but the working and living conditions at the mining camp—are a valuable contribution to the knowledge of mining and milling in central Nevada in the 1930s.

After the Cord Mill job and a short stint at mining in northern California, Vic worked for the Department of Education in Carson City. Once again, he traveled around northern Nevada where he taught continuing education classes on mining. When World War II began, he changed from teaching to working as a civilian mining engineer with the war department. Part of his work took him to southern Nevada where he did appraisals on mining claims that were within the boundaries of government land—the area that would be used for military training and bomb testing.

One of his accomplishments following the war, and one for which he felt pride, was writing several works on Nevada mining for the Nevada Bureau of Mines, including *Mineral Resources of Nye County, Nevada*. Also, while there, he worked with iron ore,

a project that eventually led him away from Nevada. He moved his family to the Upper Peninsula of Michigan and accepted a job with the Ford Motor Company, where he worked for fifteen years. He described that as a time when Ford owned many of its manufacturing resources, such as iron ore mines. In later years, however, the Ford company began changing, so Vic decided to take early retirement to pursue other interests.

From there, Vic worked for the Hanna Mining Company in Maine and Arizona and for the Arizona Department of Mineral Resources. After twenty-one years away, Vic returned to Nevada where he founded a successful consulting firm with Ralph Roberts and Bob Reeves. Like Vic, they were notable among the Nevada community of mining men.

Vic Kral passed away in May 2004 at the age of ninety-two. In addition to being a miner, Vic was also a very kind and caring man who will be greatly missed, as will his enthusiasm for Nevada mining.

VICTORIA FORD
Reno, Nevada
June 2004

PART ONE

WHILE NEVADA'S mining industry survived the Depression years, students who were studying to become mining engineers, geologists, and metallurgists had a difficult time. Victor Kral of Reno is a well-known and respected mining engineer who, as a graduate of the University of Nevada, found a variety of small, temporary jobs to sustain his wife and himself through the Depression. One of those jobs was working in the E.L. Cord Mill at Silver Peak, which he described in detail in his 1996 oral history interview.

EDUCATION:
UNIVERSITY AND ON THE JOB

VICTORIA FORD: *Today is September 17, 1996. I'm with Victor Kral in his home in Sparks, and we're going to be talking about Silver Peak, Nevada. I think first, Vic, what we want to start with is your birth date and where you were born.*

VICTOR KRAL: I was born August 7, 1911, in Pasadena [California].

Then you grew up in California as a child?

Yes, I did. From Pasadena my parents (and I, of course) moved to Huntington Beach, California, and I was there, I guess, until about 1919.

So you were about eight years old when you left California?

Yes. I was just about eight years old. I was kind of a sickly child, and eight years is when I started the first grade.

Oh, really? You had health problems as a child?

Yes, I did. I don't even know what they were, but I was not very healthy when I was young.

And so you started first grade and . . . ?

And I had no problem there. Scholastically, I caught up without any problem.

You started at Huntington Beach, but then your parents moved?

Yes, then they moved into the Los Angeles area, or we might possibly at that time have moved to San Francisco for a short time. There were several times in my life when my parents went to San Francisco and stayed there maybe for six months or something like that and then moved back to the Los Angeles area.

Was it your parents' occupation that caused them move? Do you know why they moved?

I guess they just thought they might find conditions better. They were both tailors, and they worked at home. And one of my early moves was to what is now referred to as the Watts area. It wasn't like that at that time. It wasn't a fancy area by any means. But, anyway, it was not like it is now.

It was a safe place to live still?

Oh, yes, very safe.

How did you end up in Nevada? Did you come here with your parents or on your own?

No, I had a brother, a half-brother, and somehow or other we had lost track of him for about six, seven, eight years, something like that. And through my inquiries, why, I finally found out where he was, and he found out that I was looking for him. And his wife corresponded with us, and, finally, I ended up by hitchhiking to Reno. [laughter]

That's where he lived?

Yes, he lived here in Reno.

And how old were you when you hitch-hiked to Reno?

Sixteen.

Sixteen. Did your parents know you were going to do that?

Oh, yes. Well, in those days, why, hitch-hiking was no problem for young people.

So you came to Reno, and did you stay?

I came to Reno, and I visited Reno one weekend, and I liked it so well, and I had an opportunity to go to school here, of course. So I think it was about a week or two later, why, I moved to Reno with all my belongings that I carried in a very small satchel. It was the size of a good-sized briefcase. [laughter]

You didn't have much.

No, I certainly did not.

You said you had an opportunity to come to school here. Were you finished with high school at that point?

No. No, I had one year to go. I had my senior year left. So I spent my senior year at Reno High. And Reno High at that time was where one of the gambling clubs is now; I forget the name of it.

It was in the downtown area?

Oh, yes. Reno High, on the corner of West and . . . between Fourth and Fifth, I believe it was, something like that. I graduated from Reno High here.

What year was it that you graduated?

1928.

Nineteen twenty-eight, OK. Were you living with your brother at that time?

Yes, I was living with my brother then. That's how I happened to be in Reno, because I had the opportunity to live with my brother and his wife and go to school here, of course. And then from high school, I was worried about my grades. I didn't think I could make it to get admitted to the university. But due to a fine gentleman who was principal of Reno High at that time—Otis Vaughn, well-known in the history of education here in the Reno area I think there must be some schools around here named after him.

Yes. There's a Vaughn Middle School, I believe, named after him.

Well, that would be him. Anyway, thanks to him, he went over my credits and figured out that I just barely had enough to get in. So I started the university in the fall of 1928.

Were you still living with your brother, or did you go live on campus?

Yes. I was living with my brother.

As a freshman, did you know what field of work you wanted to go into?

I knew that I wanted to be an engineer, but I didn't know what. And it wasn't very long at the university, a month you might say, that I realized that I wanted to go into civil engineering. So I started in civil engineering. After my freshman year I was looking for a summer job, and I somehow got acquainted with somebody at the Mackay School of Mines, and I found that there was work

to be had at Ruth, Nevada, in the Ely area. I went there that summer. That was the first time I had worked underground.

In an underground mine?

Yes.

What kind of work did you do that summer?

Well, I first started helping a timber man, and . . .

What does a timber man do?

Timber man is replacing or putting new timbers in the mine. That's how I started out. But I'll have to give the company much credit there. They moved the students around quite a bit, so they'd get a pretty fair idea of what it was like.

Was it part of your education to be working there?

No. Just a summer job.

But the company was aware that you were a student.

The company was education-minded, in other words. And that company, by the way, was Nevada Consolidated Copper Company, which later became Kennecott.

OK. So you started assisting a timber man, but they moved you around?

Yes. Well, then I spent the rest of my time working on the ore trains, as a sort of a brakeman on the ore trains. It's interesting, thinking back, that the ore trains were a very dangerous operation there.

How so?

Well, because there was very little space between the timbers and the ore trains coming by, and they go relatively fast.

About how fast would you say?

Well, I'd say they're going ten miles an hour or something like that, which is fast for a train underground.

And there's a narrow clearance?

Very little clearance. You have to stand between the timbers as the train's coming along. Of course, if you stand between the timbers, and considering the timbers there were about ten-by-tens, why, there was a fair amount of clearance there, but I can remember a few instances where it was close, you know, and quite dangerous. And that mine—the Star Pointer shaft is what I worked in—was using the caving system. And that means the ground is moving all the time, and, therefore, the timbers are being crushed and have to be replaced as you go along. And once in a while you get into some part of a drift where they were a little bit behind in replacing timbers, and it almost closes in. I recall one particular time I was walking through one of these drifts, and, suddenly, right behind me the whole back came down. And if I had been there, why, it would have crushed me, of course. I was lucky.

When you say caving system, was it planned that it caved in afterwards?

Yes, it was planned. It was planned that way so that you get the ground to gradually cave, and then you have ore chutes that go up into this caving ore. And you draw the ore through the chutes into the drifts below and into cars. It's a very efficient method and is used quite a bit, particularly in South America, I believe. Now, I don't know of any place it's used in the United States.

But it is still used in the world somewhere?

Oh, yes. It's a good mining system; there's no doubt about it, but at that time it was dangerous. And I don't think it's that dangerous now, because I think they watch it more carefully.

OK. But it was more dangerous then, because they didn't watch it carefully, or it was new?

It was probably more dangerous because regulations now would not allow anything like that dangerous situation to occur. In other words, if you were on the ball and kept up with the caving system all the time, there's nothing dangerous about it. But if you didn't, why, then it can be dangerous.

And so somebody wasn't keeping up on it when it collapsed behind you right there.

Yes. You can only do so much, you know. And I'm not criticizing the management; I think the management was very good, but they can only do so much. And they catch up the areas that are the most important first.

Yes. And safety regulations have changed, is that right, over the years?

They have changed tremendously.

We may talk more about that as we go along. Let's go back to that summer then. So you became really aware of how dangerous underground mining was during that summer.

Yes. Very dangerous. Yes, I was very cognizant of this. [laughter] And it was sometimes dangerous from a rather humorous standpoint. Remember, these trains were operated electrically, and you had trolley wire above, on the back, and if you were working in an area that is moving down—that is, the ground is giving slowly, the back is coming down—why, when you're walking along there, your ear may be kind of close to that hot trolley wire. And I forget what it was, but it was at least 250 volts. It was

a DC, direct current. And I can recall many times a man would be walking along with a bar, an iron bar, over his shoulders, and all of a sudden that would hit the trolley wire and give him quite a jolt! [laughter] It was more humorous that way than anything else. [laughter] Humorous to those that are standing by, at least. But . . . [laughter]

But not to the person who got the jolt, huh? [laughter]

To the person who got the jolt, I know of no instances where anybody was killed or even hurt that way. But I do know that almost everybody got shocked at some time or other. An electric shock of that nature is sort of a terrifying experience. You are really shocked.

Did you get a shock? Do you remember it?

Oh, yes, many times, yes. I recall one time my ear hit the wire, and I momentarily passed out, but I caught myself just before I fell. [laughter] But it was just a part of life, and no one paid much attention to it.

It was quite an experience for a young man.

Yes. Yes, it is.

You would have only been about eighteen or so at that time, nineteen?

I was not quite eighteen. I'm a little hesitant to say, "not quite eighteen." That's correct, but they had to stretch a point or two to allow me underground, because . . . I don't know what it is nowadays, but at that time you could not go underground if you were under eighteen. But my birthday was coming up, so they let me go.

And you were a high school graduate in college, so were you ahead of some other eighteen-year-olds, for example, in terms of education?

Yes. That's correct.

OK. What else did you experience from that summer at Ruth, Nevada? Any other impressions about mining?

Well, the most impressing thing I noticed was, if you're in a stormy area or a stormy season (and the Ely area is a stormy area), you go underground, and you don't know what it's going to be like when you come out. You might be surprised in the snow or the snow flurries or something like that when you're coming out. It's always such a surprise when you come out into the daylight to see what's going on.

Because you're so isolated while you're under there?

Absolutely. You're underground; you're working under electric and your carbide lights. At that time carbide lights were all we used, besides the electric lights that were hooked to the regular electric system when you're underground.

So you didn't experience normal daylight; you didn't have temperatures from the outside.

You have no idea what the temperature is. The temperature is always the same underground. Of course, in one way, that's the nice thing about working underground, particularly in the winter—it's always warm underground. [laughter]

Yes. And you can't hear if there's thunder storms or any of the sounds of weather, so . . .

You're completely isolated from the outside.

It's a whole different world underground.

That's right. And, of course, that was my first time working underground, so it really impressed me.

Was that experience part of your deciding to go into that particular career?

It was *because* of that experience, as well as the friends that I developed about that time, that I decided that I would go into mining. It was interesting to me; it was very interesting. And I recall so distinctly that I was so interested in the mining method we were using and how it was all done, that I wrote several letters to a friend of mine here in Reno, with the idea that there would be some sort of chronicle of what I had been doing. Instead of a diary, it was in the form of letters to my friend.

And you wrote down that whole caving process?

Yes. Yes.

Do you have those letters now?

Unfortunately, I do not. I never retrieved those.

But it really made an impression?

Oh, it did.

When you talk about the friends that you made, were they friends that you made while you were mining, or friends that you were talking about from the university? You said that had an influence.

Well, they were friends from the university, I guess, that were also in mining. Well, they were from the university, but they were there at that mine at that time. One example is Paul Gemmill, who was executive secretary of the Nevada Mining Association for many years. I met him, and I recall distinctly, on a Fourth of July vacation that we had, there were three or four of us who

decided to go up to the Lehman Caves area, which was, of course, close to Ely. And we slept out overnight there, you know, bonfire, and so forth. And I recall Paul Gemmill at the . . . all of us in the firelight of a bonfire, him reciting “The Cremation of Dan Magee.” [laughter] And that was so interesting to me. It had nothing to do with mining, of course, but that was interesting!

[laughter] But that was the entertainment for the evening?

Yes, that’s right.

Yes. Is that something that he made up, or is that actually . . .

Oh, no, it’s Robert Service’s poem on the cremation of Dan Magee. I think that’s right. I think I may have the name a little wrong. [Note: The actual title is “The Cremation of Sam McGee.”] Oddly enough, that same trip, why, we went up to the Lehman Caves. The Lehman Caves at that time were known to exist, of course, and they’d been looked at quite a bit. And that was just before the park service officially took them over. And a ranger with the park service there took us through the Lehman Caves and explained that they were not open; they were not even officially part of the park service yet, but he was there, and he might as well show us around, give him a little experience in explaining the caves to others. So we were very fortunate to have that.

That was lucky to be able to see that.

It was very fortunate.

When that summer was over, did you come back and change your course of study based on that experience, or were you already on the right track?

You’re already on the right track automatically, because the first two years of college, engineering are the same. They’re basic courses, so there were no changes to be made, except . . . Well,

that was before my sophomore year, you see, so there were no changes to be made until you start your junior year.

OK, but then, was that different? Mining engineering? Was that different than civil engineering, which is how you started?

Oh, yes. Of course, when you get into your junior year, you start taking some mining and metallurgy courses, which, of course, you would not do in civil engineering.

What were some of the courses that the university offered for mining engineers at that point?

Well, Jay Carpenter had courses on what he called mining engineering, in which we took notes in his lectures on various mining methods and the costs of mining and so forth. And there were metallurgy courses, which started out with lectures on various types of metallurgy; ended up with the laboratory courses in engineering. Of course, at that time, why, assaying and surveying were a definite part of mining engineering. Of course, the surveying would also be part of civil engineering. And now they don't seem to be stressed very much, particularly assaying. But anyway, those are some of the courses.

OK. And that was offered in your junior year or your junior and senior years?

Junior and senior year.

Is what's offered now changed from when you took . . . ?

The assaying has been dropped. No, many of the courses are much the same, except there's a little more specialization now. Metallurgists are metallurgists. At that time a mining engineer's courses were about equally divided between mining, metallurgy, and geology. Fact is, I took more geology courses in my first four years than the average geologist does now. It just sort of turned out that way.

And that shows how much it's become more specialized? You had a broader range of courses?

Yes. That's right

So that you could go into any of those areas, or you could know a little bit about all of those areas?

I should clarify that a little bit. See, I took more geology, actually, than a geologist would have taken at that time his first four years.

By choice, because you were interested in it?

By choice, that's right. It was by choice, as well as the curriculum. But you had a lot of electives, and my objective was to spread it pretty well evenly between mining, metallurgy, and geology.

OK. Were you learning about new technologies as you went through these courses? Were mining, metallurgy, milling—any of those processes changing at the time you were going through school?

Not much. They were not changing very much. However, keep in mind that flotation was relatively new at that time. It came into being in the very late 1920s or early 1930s. And so that technical change was important in the metallurgical end of my university career.

OK. So the flotation process of milling was being taught.

That's right. Oh, very definitely, stressed very heavily, but they also stressed the older methods, which might be very applicable.

And some of those were?

Amalgamation and gravity concentration.

So those were still being taught, because they were still workable?

Oh, yes, still being explained, you know.

But the flotation was the new thing on the scene.

Yes, yes. That's right.

Anything else that was new that was being taught? This doesn't sound like it was a time for big changes in the mining industry then.

No, it was not. Nowadays there are a lot of relatively new ideas coming in. Of course, cyanidation was being used That was also being stressed, you know.

That was already in use when you were in school?

Oh, cyanidation is a very old method. That goes back to about 1910.

While you were finishing your schooling, did you continue to work in the summers in the mining industry?

Very definitely.

What other jobs did you have while you were in school?

Well, my first summer, of course, was the freshman year, which I mentioned at Ely.

Yes.

After my sophomore year, I ended up having a job with a small gold-mining company near Bishop. And that's where I met Gerry Hartley.

And he's the friend that you mentioned?

Yes. Yes, that is correct. Yes, I knew him beforehand, but I didn't know him very well. School was out, and he was getting ready to go back to this mine out of Bishop. And I was going to go out to work for a quicksilver mine—B & B Quick, actually, on Montgomery Pass on the way to Bishop. So I said, "Well, you might as well come with me," and then ended up, I took him directly to the mine. And his dad, who was the operator there, was there, and one thing led to another, and I ended up working there instead of going to the B & B Quick. So, unfortunately, I have never been to the B & B Quick. [laughter]

What kind of work did you do that summer after your sophomore year?

Well, we were sinking a shaft there. And I was one of the people taking care of the compressors and other equipment on the surface, so that the pumps could keep going and the men could continue working in the shaft. It was a very small operation, and it had its many difficulties, but, of course, those difficulties meant I learned more about what could or could not be done.

Can you tell me a little bit about what those difficulties were and what you learned?

The pumping, of course, was the biggest problem. And the suction pump on the big Cameron pump, the suction line continually moved, and here was the problem: this would rub on the timbers, and, therefore, the suction line would wear a hole in itself. Of course, that would stop the operation. So we finally ended up wrapping the suction line with rope. I remember so distinctly going to town (and by the way, I also drove the truck to get sup-

plies). I went into town to get some dynamite, and I think it was a half-ton of dynamite. And this rope, I think, was 150 feet of rope. Well, I had put the dynamite on. I wanted to tie the dynamite down. So how does one tie the dynamite down with 150 feet of rope you just got without cutting it? You just got too much. Well, anyway, I did it, and I learned a few things about handling rope. [laughter] And, of course, how to handle the rope without the necessity of cutting it into small pieces.

Anyway, here I was; I brought back to camp a half ton of dynamite, other supplies, as well as 150 feet of rope to wrap the suction of the Cameron pump. The Cameron pump is operated by compressed air. And, of course, we had the problem of always keeping the compressors going, and they were not very good They were not modern compressors by any means. They were off-breeds. We had plenty of problems with them. Our power was with single-cylinder engines. Hoisting was done by a four-cylinder Novo hoist, which is the only, more-modern piece of equipment that we had there. But, anyway, one way or another we worked it out, and

Can I ask, when you decided to wrap the suction pipe with rope, how did you arrive at that solution? Was it something that somebody else had already tried, or was it something that you all came up with together? Do you recall?

It was just the logical solution. You had to protect it with something, and rope would be a very good protector. It would last through more rubbing. So it was just sort of a logical step that would I don't know if anybody ever did it before or not. Didn't make any difference, because it was just logical. [laughter]

Just logical, but that's the kind of thing that you had to come up with to make this project work and to keep the equipment operating and so on.

Oh, yes.

And you thought that was a good learning process for you to see?

Yes, it was a pretty good learning process, yes. [laughter] This was a 300-foot shaft. We were sinking it to the 400-foot level and branching out from there. We were going to, anyway. We did run into a little bit of ore at the 400, however, not enough to make much difference. That was hoisted to the surface and was sort of kept by itself, and I understand later someone put up a small mill and milled that ore. I kind of wonder if they ever made anything out of it.

But there were several little innovations we used, such as developing a water system for the change house. Having several miners around, you have to put up a change house, which we built for changing clothes, showers, and so forth. When you come up from underground, you've got to have a hot shower. For one thing, a man coming out of the shaft is cold. As soon as he hits the outside air, he's cold. He's comfortable underground where it's warm, but when he gets out, the cold blast of air hit him pretty bad . . . got to get into the change house right away and get a hot shower. So we devised various methods for our water system there by burying a couple of large oil drums. These were not fifty-five-gallon drums; they were much larger than that. Anyway, little things like that were done.

What was the water supply there? Did you carry it in?

We had to haul water in.

So that was the summer between your sophomore and junior year?

No, it was the summer after my sophomore year, because I stayed there beyond the beginning of the year, and I did not go back to school. I had a job there, and I thought I'd stay and earn enough money so that I'd have something to go back on when I did go back. Well, that job played out though, and I went on to other work.

So you took a little break in schooling between sophomore and junior year?

Yes, yes, I did.

How long a break?

Yes, that was only one year. Then, after my junior year, I stayed out again, and that break was, I believe, for five and a half years.

Was it economics? Was it financial necessity?

Yes, strictly economics.

Did it have to do with the Depression years, because you would have been in that . . . ?

Yes, it was in that time.

It was hard to get the money to go school.

Oh, yes. After all, you know, I was earning five dollars a day on most of these jobs. Yes, my first job out of school when I graduated, I was getting six dollars a shift. [laughter]

Not a big increase, was it, for all that education? [laughter] So during this year off, what else did you do besides that job with your friend Gerry?

Well, I went to northern California, and I had a job with a placering operation, a company that was in the process of rehabilitating an old hydraulic mine. And I worked at that for several months; I don't know just how long. And then I believe . . . Yes, I came back to school then, and I did finish my junior year.

Junior year, yes. And about what year is this then? About 1933?

No. My junior year was the year of 1931-1932.

And then you took a five-year break?

Then after that, I was out of school for quite a while. About a year or year and a half or something like that was spent working for the highway department, Nevada State Highway Department, on their planning survey division, I guess, wherein I had the opportunity to go around much of the state making rough Brunton odometer surveys of all the, you might say, tertiary roads and trails in the state.

So you got to know Nevada pretty well during that time.

Yes, that really gave me a good chance to get acquainted with Nevada. I really appreciated that job, because I spent quite a bit of that time in southern Nevada and then after that went into northern Nevada. Remember, this was before the days of the four-wheel drive, let's say before four-wheel drives were common. One must remember that later there were four-wheel drives in World War II called FWDs, as I remember. Anyway, I worked for them for at least a year and a half or something like that. And it was during that time, oh, that there were many small jobs that I worked on, very many, and they were short duration. At that time you were very lucky to get a job, and you grabbed it.

Jobs were hard to find during the Depression?

Yes, that's right. That was the latter part of the Depression.

Did you get any more mining experience during that time that you were away?

Oh, at the hydraulic mine, I learned a little bit there.

After the highway department, did you . . . ?

No. There was no mining experience there whatsoever, except as to where some of the mines were and some of the old camps that were around, you know. That's all.

So that five-year break was really about surviving the Depression.

Oh, that's all.

Yes. Then, when you could go back to school, what year was that?

Well, let's go back to the highway department. I had certain vacation time coming from the highway department, and I got a job using that vacation time surveying some mining claims out of Winnemucca at a mercury mine referred to as the McCoy . . . no, not McCoy. Anyway, at a mercury mine about sixty miles or so northwest of Winnemucca. And that gave me enough money so that, when next semester of school started, which was January of 1938, I went back to school.

By the way, during the latter part of my highway department experience, I was married. And between the \$265 that I saved up from the survey job and my wife working, I was able to go back to school. And I went to school then for the year of 1938. In other words, I started in what you might call spring—actually it's winter—January of 1938, and I finished December of 1938. And that summer of 1938 I worked on various jobs, and part of it was doing some surveying with the Soil Conservation Service out of Yerington.

I might add that during that five-and-a-half-year period that I mentioned previously, I did work Oh, that was the time when we had the WPA and whatever. There, one project was laying out some triangulation survey grids in the state of Nevada, and I got involved with that. And, in fact, oddly enough, my surveying experience that I picked up helped me a great deal getting jobs here and there.

Although you weren't getting direct mining experience, you were getting the kind of experience that was so valuable to you later.

Well, it was indirect. Yes. That's right. It helped later on. And then from that WPA job, we went to the Leviathan sulfur mine, and that's about thirty miles due south of Gardnerville. And I worked there for several months.

And that was before you went back for your senior year?

Yes, that was before I went to the highway department. I guess the highway department came after that, yes.

So you graduated in 1938.

Christmas or . . . well, December of 1938.

December of 1938. You had a wife. Did you have children yet?

No children.

No. But a wife, so you were no longer a single man. You had responsibilities.

Thank goodness my wife helped me get back to school. She helped me a lot, all the time, going to school.

Or it might not have been possible?

Yes, it would have been very difficult.

Yes. What kind of work did she do that helped you through school?

She spent most of her time working in a jewelry store, a clerk, bookkeeping, and stuff like that.

E.L. CORD MILL,
SILVER PEAK

O K. *WHAT HAPPENED when you were a senior? Did you go right to work in mining when you were finished? When you graduated, did you have a job?*

When I graduated, I went directly to the Cord Mill at Silver Peak.

Tell me the story of how that came about. How did you get that job?

Well, in December of 1938, before the school year was over, why, S. Power Warren came to talk to us at what we called the Crucible Club at that time—a club of mining engineers, so to speak.

On campus? Is that where it was?

Oh, yes, students. S. Power Warren came to talk with the students there. And I knew that he was starting this mill there, so I talked to him about a job, being as how I had had milling experience previously. And he said, “Sure, that’s fine.”

And who was S. Power Warren? Was he a significant person?

Yes, he was a fairly well-known metallurgist from Denver, and, I guess, he had a pretty fair reputation. He possibly did some teaching at the Colorado School of Mines—I think he did. But, anyway, he had some kind of ties in the Colorado School of Mines.

And he also had ties with the Cord Mill in Silver Peak?

He was the designer, and I guess you'd say the mill superintendent.

OK. And so you asked him for a job, and he said he had one for you.

Yes, right. He was certainly looking for people that had had cyaniding experience.

OK. Now, let's backtrack just a minute. Where did you get your cyaniding experience? I'm not sure I picked that up.

The reason you didn't pick it up is because I forgot to mention it.

OK. [laughter] Let's go back and get that.

Yes, well, we'll go back a little bit farther than that. In the summer of 1933, I was doing whatever I could, wherever I could, and I was working on a truck, and due to an accident, I had a very serious gash on my left eye. That was September of 1933, and then for a couple of months I was hospitalized one way or another—not actually in the hospital, but I was under medical care and could do nothing. And then about February of 1934, another one of these short jobs came along, and several of us that had known each other in school got a job about forty-five miles east of Tonopah sampling a silver mine up there—the Longstreet Mine.

Named after Jack Longstreet [famous Nevada frontiersman]?

That's right. That's who it was named after, yes. And I worked there. That helped out a little bit financially. And then, right after that, I got a job at the Silverado Mill south of Wellington near the state line. And that's where I got my cyaniding experience.

Was that your first experience in a mill rather than in the mining process?

That was my first milling experience out there, yes.

And was that quite a bit different from anything else that you had experienced—the cyanidation process?

I had no experience in cyaniding before that. Fact is, I know very little about any other type of milling. I've had no experience in other types of milling. Well, that's where I learned something about cyaniding.

So that gave you the experience to get the job after you graduated then? And you worked just several months in that mill outside of Wellington?

It was after the Longstreet Mine sampling job that three of us that had known each other in school (and we also happened to work on the sampling job), we all got work at the Leviathan sulfur mine. And that would have been the spring of 1934. And we worked there for several months. I believe the mine shut down for a while or shut down entirely, I guess, was the reason we finally left. That would have been in 1934. Leviathan—about thirty miles south of Gardnerville. It's west of Highway 395.

OK. So you went there before you went to Wellington, and the Leviathan came first.

Yes, I think it was after that that I went to the Silverado Mine south of Wellington.

And that's where you got your milling experience, cyanidation experience.

Yes, that's right.

Will you compare the two? Did you like the milling experience compared to your mining experience? Did you have a preference at that point?

I don't think so. It just so happened that that's what was available.

All right. Let's talk about Silver Peak. You got the job, went there after you graduated.

No, no. I'm going to lose something if . . . I'm in 1934 now. Yes. And in 1935 is when I went to work for the highway department. The latter part of 1935, I guess just about all of 1936. As far as I know, it was also 1937 there.

That sounds about right, because then you went to the mercury mine and then back to school, right?

Yes, that's right. I think that pretty well fits. OK, I went back to school and finished school, and then I went to Silver Peak.

And did you go there alone? Were you hired to go there alone, or did Mr. Warren hire more than just one person in that class?

Oh, he hired others, I believe. He hired Gerry Hartley for one thing. I think he and I went there together, because Gerry wouldn't have had any trouble at all getting a job with them, because Gerry had lots of milling experience.

He had more milling experience than you did?

Yes, a lot more than I did. So I'm sure that . . . yes, we went there together. We roomed together, and . . .

Where did you room? Tell me about living conditions there.

Well, they had some tent houses set up along that . . . The road there by the mill is right on a ridge, and tent houses were on the north side of this more or less east-west ridge. And they were very simple and very common in those days.

Did they have a wood foundation?

Yes, they had a wood foundation and wood floor.

OK. And how many men to a tent?

Two or one.

So you and Gerry roomed together?

Yes, Gerry and I roomed together, and we worked together.

Where did you take your meals? Where did you get your food?

We must have had our meals at a boardinghouse right there. There was some kind of a facility right there, and I can't recall right now what it was. But I know we didn't have to go any distance at all. It was all in walking distance. It was not up at the mine, because I have never actually been at the Silver Peak mine itself, the Mary Mine.

What was your first job there at the E.L. Cord Mill?

The first job I had, which is actually the only job I had, was what they referred to at that time as "solution man." In other words, I took care of the cyanidation process. I had nothing to do with the actual milling. By milling, I mean the grinding of the ore. And that was usually the way that was handled in those days. One man in a mill would handle the grinding part and possibly the flotation with it, and another man would handle all that was involved in cyanidation.

Tell me, how many men did it take to run this mill per shift?

Two.

Just two?

Yes.

That's all. And you went twenty-four hours a day, though?

Oh, yes. Three shifts ran the mill. The operation would be going continuously, seven days a week.

What were the shifts? Do you remember what times?

Well, ordinarily they were 7:00 a.m. to 3:00 p.m., 3:00 p.m. to 11:00 p.m., 11:00 p.m. to 7:00 a.m. Or it might be 8:00 to 4:00, 4:00 to 12:00, 12:00 to 8:00. I don't recall right there, but it was one of those.

OK. And did you end up on every shift during your time there because of the rotation?

Yes, we rotated shifts every two weeks.

OK. So how many total men were there in the area where you lived who worked just the mill, would you say?

Well, just in the mill, it would have a . . . let's see. Well, you have to keep in mind, there are two men in direct contact to the operation. Sometimes there would be another man on that shift from whatever. And also, there is a mill foreman that is around all during day shift and possibly into the afternoon shift, as well, sometimes. That's about what you would have for the actual operation.

But in so far as the housing in that area, why, as I recall, there were a few men living near the mill that were also involved with

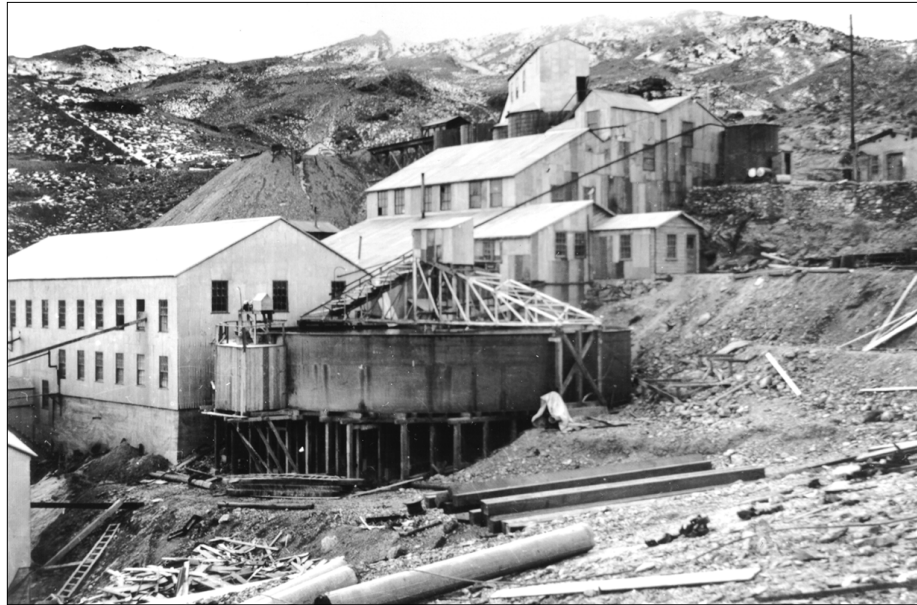
the mine. There was an accountant there that I believe lived in that particular area. And there was another engineer; I forget what he was doing, but he also was in that area. There were a few more than the number to actually run the mill. To say that it takes about ten to fifteen men or ten to twelve, or something like that, would be about right to operate that mill continuously.

And then, that allows for rotation and everything.

Oh, yes.

So it's really not a very large number.

No, a small, small number.



“You’re talking about something that’s about like a three-story building, and so it took young men, rather agile, to operate this, because they’d be running from the top to the bottom quite frequently.” The E.L. Cord Mill at Silver Peak. (Photograph courtesy of the Nevada Historical Society.)

And so your job was the cyanidation process. Could you describe to me what you would do during a shift for that job?

You would make sure that your cyanide solution was at the proper level in the tanks and that the sands in the tanks were properly being discharged from one and going into the other. And there was quite a bit of checking of the valves there to make sure that the solution was going to the proper place in the proper quantity. And I recall that all the pumps (they were very good, small centrifugal pumps) were on the lower level. And you're talking about something that's about like a three-story building, and so it took young men, rather agile, to operate this, because they'd be running from the top to the bottom quite frequently.

Between checking gauges and checking their pumps and . . . ?

Yes. Yes, it's quite a little moving back and forth.

OK. Was it possible to take any breaks during that time, or when you were on the shift were you working the whole time watching all of this?

You're on the whole time. You don't consider breaks in this business, because actually if everything's going right, that's your break. You really don't have to do anything—just stand there and watch things. That's all.

Just monitor. What if things aren't going right? What can go wrong, and what does it involve?

If things are not going right, why, you might have too much solution in one particular place. You might have some sand spills. Then you'd be moving rather fast.

To correct the problem?

Yes. Turn off pumps, turn on pumps, and regulate them. These pumps are, as I mentioned, they were small, centrifugal pumps

and very good, because you could turn the valves off against the centrifugal pump; that makes no difference whatsoever. Or you can turn the valve half on, and you can control it very well. That was very good equipment there in that mill.

Was this all new equipment, could you tell?

Yes, it was. Well, practically all of it was brand-new. I'm sure that the grinding unit came from some other place. I know that the classifier . . . we had a large, what we called a "rake bowl classifier." That came from Weepah. And as is very common in the mineral industry, sometimes you have to cut things in half and put them back together again. And that's just what they did to this classifier: they had to cut it with a torch, cut it more or less in half, and then welded it back together again at the mill.

In order to move it?

To move it, [they] had to cut it. Yes, you cut it to move it, and then you weld it back after all the pieces are in the proper place. I recall hearing recently about a tractor, a Caterpillar tractor, being cut up that way and put back together again underground in a stope.

So that's a practice that's still going on . . .

Yes, right.

. . . in order to make things mobile.

Not very frequently with a tractor, but, yes, anyway, it is done frequently.

Do you want to kind of talk us through the entire process of the E.L. Cord Mill? Now, when you were there, it was called the Prescott Lease Mill. Is that correct?

Yes, it was. Actually, it was called the Prescott Lease. The operation was called the Prescott Lease, although the mill itself was commonly referred to as the Cord Mill. Why, I don't know.

OK. What does that mean, the Prescott Lease? Was somebody leasing the mill from Cord, or how does that work?

I have an idea that the operation was a lease from the owners of the property, and, therefore, it was called the Prescott Lease. And, I think, Prescott in this case was the name of a man and had no connection with Prescott, Arizona. And the Prescott Lease, of course, would be including the mine as well as the mill.

So, where the ore was coming from was also part of the same operation at that point.

Yes, yes.

That was the company running it.

Don't let me give you the impression that the mill was actually a lease. The mill was not a lease, but the mine would be a lease, and, therefore, the mill was built for the Prescott Lease.

OK. Would you talk us through that [milling] process? We've got a flow sheet

Yes. This flow sheet is excellent so far as . . . it's rather brief, but it gives me a pretty good idea as to what I actually did. Of course, the ore goes through the mill, the grinding unit, and from there it went through the flotation process.

And tell me what that was.

The flotation process, where certain oils are added to the pulp, and the pulp is then run through rectangular tanks, and by the addition of air at the bottom, causing quite a few bubbles, why,

the mineral which you are trying to float adheres to the bubbles, comes to the top, and floats over the side of the tank, and it's collected. And, of course, this is a rather involved process requiring rather special attention to the feeding of these special oils. And then the concentrate itself here went through the cyanide process.

After the bubbles took the mineral, the froth (concentrate) went through the cyanide process?

Yes, that's correct. And this cyanide process was entirely separate from the rest . . . from the sand leaching that went on just below that.

Was that usual? Because the cyanide process had been in use now for twenty years, almost thirty years or so. So was this the usual method, or was this something new?

No. No. The cyanidation of concentrates was rather new, because they sometimes are difficult to cyanide. And in this particular case, though, it worked. Keep in mind that the part of the crushed ore that went through the flotation process was the fines or the slimes. But the sands went directly to the lower part of the mill, which was the sand-leaching part. There were six tanks there. And the sands first went to the upper three tanks and through a distribution system, which is rather unique and very old, though. The sands were distributed evenly in the tanks and leached there by the addition of cyanide solution, which was drawn off the bottom. Then after a certain length of time, being two or three days, why, the cyanide solution would be drained out of that tank; the sands would be sluiced from that tank to a lower set of tanks. And by doing this, the sands are aerated—they are put in a different position in the tanks to get away from the possibility of channeling in the sands. It was a unique method of sand leaching. And I had never heard of it before, and I don't know that it's been used very much, but apparently it was an idea that S. Power Warren came up with. And I think it was a good idea.

And the result of that was a more even distribution of the cyanide? Is that what you're saying?

Well, it gives you a better distribution. The cyanide is distributed evenly in one tank, but then there's always a possibility of channeling, and by moving the sand again to another tank, you get away from this. You put the sand grains in a different position than they were before.

Which distributes them more evenly?

Yes.

Plus, did you say something about adding oxygen which helps?

Yes. It adds oxygen, which is necessary for the cyanide process, and that helped a great deal.

There was one peculiar thing about that system, though. Because of this continual sluicing of sands from one tank to another, you put a lot of cyanide into the atmosphere. And we always noticed that when we were working there. That quantity is not poisonous, but it was a little bit objectionable.

Odor? Is there an odor?

Yes, it's a slight odor.

Yes. But it didn't have any impact on your health that you could tell?

Oh, no. No, it was really not a health hazard. That part there was not a health hazard whatsoever. No. It's not hydrocyanic acid which kills people. But we noticed that there was quite a little . . . well, it would be a humid atmosphere with a lot of cyanide, actually, that you're breathing the solution. But you're not breathing enough of it to do you any harm that we could tell.

You felt the same; you didn't have any ill effects?

Oh, yes. Yes.

Just didn't smell good.

Yes. It's just an example that the human body was actually taking in cyanide solution but not enough to do any harm.

Were there any safety measures that you had to follow? For example, did you have to wear any kind of a face mask to protect you from that or . . . ?

No, no. No. No, that would be impossible, because you'd be wearing this continuously, all the time and under great physical exertion, and it wouldn't be practical. And it really wasn't necessary at all. No, there was no problem there with that.

This kind of takes us into a little side trip here, but were there other safety measures that you did have to follow while working on that? Hard hat or steel-toed shoes, any of those things?

No. At that time hard hats were, as I recall, not necessary in the mill. In those days, though, hard hats were definitely necessary underground. In the mine, but not in the mill. However, there is so little [that] can go wrong that there is no safety measure that I can think of, except for ventilation. You had to keep in mind that you needed good ventilation in a place like that.

And was this particular mill set up with good ventilation?

Yes, it was. It was. But, in going a little bit farther in the process, I'll explain to you where there is a hazard, and it did cause some trouble there. The cyanide solutions, what we call the pregnant solutions that carry the gold, go through a precipitation process. It's a bag precipitator, wherein zinc is combined with the cyanide solution; then the gold replaces the zinc and forms a black sludge that contains the gold values. This black sludge or precipitate is then dried and then put through a furnace to melt down the bullion. At this particular mill, to dry the sludge or to

dry the precipitate, they used drying pans, wherein the precipitate was put in rather large, flat pans with heat underneath the pans to heat the precipitates and drive out the water or cyanide solution—evaporate the water.

Now, what's dangerous here is that you're dealing with zinc precipitates, and when you heat zinc, you put off zinc fumes, which are poisonous to the body. And at one particular time, why, there was something wrong with the ventilation or something wrong They got too much heat under the zinc precipitates. Anyway, the fumes were extreme in the mill, and everybody in the mill became sick. And the sickness was . . . I think, it was a combination of diarrhea and vomiting, yes. And it just so happened that I was lucky—that happened when I was off on a long break, and I was out of the mill. And when I came back, I heard about it, and it was unfortunate that everybody was sick. And the company took very good care of everybody and brought in medical help immediately. And it was just a matter of taking proper medicines to counteract this, and it was taken care of rather rapidly. But it just gives you an example of what can happen if some little thing goes wrong.

Did they have to shut down during that time when everybody got sick?

No, I don't believe they did.

They just got some ventilation in there, kept it going.

Yes, increased the ventilation, yes. Those that could, kept working; that's all.

OK. And when you said they brought in medical help, do you know, was it a company doctor, or did they bring in a doctor or just medicine? Do you recall?

No, they brought in help. They consulted medical people to find out what could be done. After all, Silver Peak's quite a ways from any real medical help in Tonopah.

Right. Tonopah would have probably been the closest?

It would have been the closest, in Tonopah. Not at all times did you have good medical help in Tonopah. Tonopah very frequently has problems having a doctor there.

So that was, to your knowledge, the only danger that ever arose at the mill while you were there—lack of ventilation?

That's all. Yes.

Is there more that you want to say about the process? You've described this method of moving from one cyanidation tank to another. That was unusual; you had not seen that before.

That was new to me, to transfer sands from one tank to another.

The rest of the process was similar . . .

Yes, very. Except that large-scale sand leaching, as this one was, was not done commonly in those days. Sand leaching is an old, old cyanide process that had been used for many years and was very common in the very early part of the century. But it was not common in the 1930s and 1940s.

So this was one of the few mills that had that process?

That's correct, yes.

Were you aware of any others? Do you know how many existed about that time?

No, I don't, no. Ordinarily, in the cyanide process, the ore is ground to a finer state, and then goes through a, what we call, "counter current decantation cyanide process," where everything is in pulp form. There are no sands. You're not handling anything in sand. Everything is ground finer or is handled in pulp form.

OK. Why was it that the process with sand leaching worked here? Was there something about the ore that was coming out of that area, or it just happened to be the particular technology?

I believe that S. Power Warren must have made . . . obviously, he made many tests on the ore, and he must have decided that he could get the values out of the ore without grinding it so fine. Therefore, he saved quite a bit of money grinding, and it worked just as well.

I see. So then with that combination, it was a financial savings to the company to put those particular processes together.

Yes.

Where in other areas, they might not have been able to get the value out of the ore without grinding it.

That's correct. Yes. Apparently, the ore was such that the values were in the cleavages, you might say, so that very little grinding would release the ore. Just as today, why, we're doing a lot of heap leaching, wherein, if the ore is merely crushed, the cyanide solutions can permeate the cracks in the rock and thereby remove the values. Much the same general idea, but here we used the sand-leaching system.

A great deal of testing is done before a mill is built. And the nature of the ore, the nature of the way the mineralization occurs in the rock, will determine the metallurgical process you use to get the gold out of the rock. And, of course, nowadays we do a tremendous amount of research that way, and because of this, we came up with the heap-leaching process, whereby we could get practically all the values out without any fine crushing at all.

Which is why we no longer see the mills like they were built before. You have the leaching pads instead, because the crushing is just . . . you don't require as much.

Yes. That's right. You don't require quite as much crushing. However, in other places you may and, therefore, use the same, more common system.

OK. Even so, you'd never seen that transfer from one cyanide tank to another. You haven't seen it since?

I have never seen it before or after, and I just wish I knew a little bit more about what the actual results were, but I have no idea.

But you do know that that was different than anything at that time.

It was absolutely different. Yes, the transfer idea was different.

And as far as you knew at the time that the Prescott Lease mill was operating, were there other cyanidation mills operating in Nevada? Were you aware of others in Nevada?

Oh, yes. The cyanide process was all over the state. Fact is, there were two other mills right in Silver Peak using the cyanide process. And I guess the one . . . there was a mill west of Silver Peak, the Sunshine Mine was operating there. I don't know anything about that mill.

That came later, did it, than the . . . ?

Yes, well, that was there at the time I was, but . . . no, I wouldn't say it was later than the Cord Mill. It was probably there before the Cord Mill. But these other two smaller cyanide mills in Silver Peak were there long before the Cord Mill. They may be there now. [laughter]

In fact, one of them . . . parts of it are still there within Cyprus Foote Mineral lithium plant.

Oh?

Yes. It's all in that area now, so you can see some remains of where that mill was. But there are some timbers and things that still exist that became part of this whole different [lithium] processing. Those cyanide mills in Silver Peak are gone.

Oh, they are?

Yes. They don't exist anymore.

One was the Chiatovich.

That was the first one, correct, in Nevada?

I don't know. But I don't really know when the lithium mill was put in, but that would have been . . .

That came in the 1960s.

That's when I was gone; I was not in the state then.

You weren't in Nevada then?

Yes.

Let's go back to your time then at the mill. So you were working seven days a week?

Yes, seven days a week, eight-hour shift. And you had some time off, of course. If you were on afternoon shift, as an example, you'd have practically most of the day to yourself, you know. And Gerry and I would go out and look around the area somewhat. We were very much interested in visiting the crater which appears in practically all the pictures of that area. And then, it so happened that when Gerry Hartley was a very young man, why, his father operated a lead-silver mine—I believe it was called the Harmel or Hammel or something like that—not too far out of Silver Peak. We went over there to visit that little property. And oddly enough,

a picture of that operation, of that little mine, was passed out by the Central Nevada Historical Society just recently.

And so you got to see it again.

Yes.

It was taken about the time you were there, was it? It looked like the same . . .

Probably. Oh, no, no. The picture was probably taken during the operation. Yes. We were there much after the operation, probably in the 1920s.

And we visited the Sunshine Mine and went underground there to see what they were doing.

What were they doing there?

All I remember about it is that they were using a shrink-stope system, which is very common. But the young man that was mining engineer there had got his training at Boston, one of the big schools in the East, and he wanted to show us this unique system.



“We were very much interested in visiting the crater which appears in practically all the pictures of that area.” (Photograph courtesy of the Nevada Historical Society.)

And we were surprised to find that it was nothing but common, old, shrink system, which was used all over the state of Nevada.

And what is that?

He was a graduate of MIT, which is a very astute engineering school. But if you want to learn mining, you better go to one of the western schools. [laughter]

Why is that?

Well, because you're right in the vicinity of mining. You're in the area, and you're more apt to get people that really know something about mining.

The shrink system is very simple. It's where you're working in the stope, you blast the ore down, and the bottom of the stope is attached to a metal chute where you draw the ore out. And you draw up enough . . . just the right amount of ore so that the men can still work in the stope. And they're working *on* the ore; they're standing on the ore with their equipment to drill the ore above them. When they blast, why, then more ore is drawn out to give enough space for men to get back in there again and do more drilling and blasting.

But he was all fascinated with this new system, and it was a commonly used system in Nevada.

Yes, it surprised us, both Gerry and I, that here this young man mentioned this strange system that they were using, and it was what we had used for years and are still using in small mines. [laughter]

OK. What other exploration did you do in your free time around that area?

Oh, that's about it. When we had a small amount of free time, you know, like during the day, why, that was ideal. That's about all we did. However, I must mention that I had an uncle who was

a miner, and he happened to be at Silver Peak at that particular time. And so I visited him. And I guess he was quite a character around the country. He came over here from Austria about the turn of [the] century, and he'd been mining at western camps all over—a typical ten-day miner, you might say.

What is that?

A ten-day miner is one where he stays on a job for a short period of time, and then after a week or two or something like that, he decides that he has a little money in his jeans, he's going to quit and go elsewhere. So that is common; the term "ten-day miner" applies to these particular people. Well, I guess at that time, why, my Uncle Johnny toned down a little bit, and he'd been working there for quite a while. Anyway, it's odd that I visited him at that time, and that's the last time I saw him. It was about five years or six years or so after that, I inquired in Silver Peak and found out that he had died of silicosis at Goldfield.

Did he have any signs of silicosis when you met with him?

He probably did. He had a cough, you know. He was an interesting guy. He was commonly referred to by his cohorts as "Moonshine Johnny." [laughter]

And why did he get that nickname?

I have no idea why As far as I know, he didn't have anything to do with making moonshine, but anyway they referred to him as "Moonshine Johnny." I suppose he was a . . . well, he was a kind of a humorous character, and I found out from someone at Silver Peak several years after that, that his last days, why, he was in the Goldfield hospital with miners dying of silicosis, and he kept the rest of them more or less amused by his stories and antics.

So he was a great storyteller and well liked by the miners.

Yes, apparently.

Yes. You said his name was Johnny? Was his last name Kral? Was it, your father's . . . ?

No, no. His name was Hausmann. He's my mother's brother.

And he came from Austria. Did your mother also come from Austria?

Yes, she did. My mother . . . well, my uncle, too, were born and raised in Vienna.

And did they come over together to the United States?

Oh, no. No, no. My mother came over first, and then I don't know just how it worked, but my mother had had a son in Austria in Vienna. She came over to the United States but left the son in Vienna. And then her brother Johnny came later and brought the son. So my brother, or actually half-brother, was brought to the United States by Johnny, my Uncle Johnny.

And that's the half brother . . . I didn't catch his name, your half brother.

Edward. His name was Brenkuss.

OK. So that was your half brother, that you lived with here in Reno for a while.

Yes, that's the one. That's correct. That's the one that brought me to Reno.

OK. And back to your Uncle Johnny, was that the only time that you'd ever seen him or met him?

No, I had seen him a few times before that. I very seldom saw him. He visited us in the Los Angeles area a few times.

But that was the last time that you saw him alive.

Yes, that's the last time So that was one of the memorable things about that time in Silver Peak, was being able to visit with him.

When we were talking about how I happened to come to Reno, I didn't elaborate very much, and then it's rather interesting in what coincidences can happen. I'll go into that now, because it may be of interest to somebody. Anyway, in about 1925 or 1926 or somewhere along there, I lost track of my brother and had no idea where he was. So I visited his old friends and people that he had worked with in the Los Angeles area. I remember the Cannonball Express was the name of the company. Anyway, I visited them, and I asked if they had any idea where my brother was, and they . . . no, they didn't. They had not heard from him for many years. Well, somebody in that company was traveling in northern California. The same time my brother, I found out later, was a traveling salesman selling candy in northern Nevada and northern California. And either this other party or my brother were stopped on the road. They had tire trouble, and the other party stopped, and in discussing themselves, why, they realized that they knew each other, or that they had connections. And, therefore, this man mentioned to my brother that I had been in the office asking about him. So my brother's wife wrote to my mother in the Los Angeles area. That's how I got the connection. And it was a short time after that, why, I hitch-hiked to Reno . . . and came back here to school.

It's interesting that you had an uncle who was in mining, and that's the life that you chose.

Absolute coincidence. No connection whatsoever. [laughter] It sure is, because as was very common in the days of my youth in the mid-1920s, why, most young people that were engineering-inclined were always thinking of electrical engineering for some reason or other. I know I did. And then I knew I was going to go into some type of engineering. When I came to Nevada, why, it was due to my associations (again) that I decided on civil engi-

neering. And then, again, due to other associations, I have transferred . . . gone into mining. No connection whatsoever with my uncle.

I have one more question about your uncle. Do you know whether he came to the United States to do mining? Was he mining in Austria, or was that simply the work that was available to him once he got here? Do you know that story?

I would say it was simply the work was available to him. Oddly enough, most people, when you mention Austria, would say, "Well, he was probably a miner in Austria, because an awful lot of miners in the United States came from Austria." But my uncle came from Vienna, and coming from the city of Vienna or coming from the outlying areas of Austria are entirely different. For one thing, they don't even speak the same language. The Austrians in the outlying parts of Austria at that time were Slavic people. And when I first went underground and worked underground in the mines, I ran into these Austrians, and I thought they would speak German, the same as I used to speak at home. But, no, they were Slavic people. The mining was in the outlying parts of Austria.

The same country, but a whole different culture, really.

Very different. They were Slavic people.

OK. But you did find that, when you went into the underground mining, when you started here in Nevada, there were lots of people with . . .

Lots of Slavic people that came from Austria.

OK. So that was one of the groups. Were there other [ethnic] groups that you saw when you were out in the mining industry in Nevada?

Not in Nevada, necessarily, but later on, elsewhere in the Midwest, I ran into the people that came from Cornwall, which we

commonly refer to as Cousin Jacks. And also the Finlanders. Finnish people were involved in mining quite a bit.

But that was more in the Midwest.

Yes, that was in the Midwest. However, there are lots of Cornish people in western mining. Fact is, they're very common in the Grass Valley area, along the Mother Lode.

OK. Why are they called Cousin Jacks? Do you know where that came from?

I don't know. No.

That's a term that's just used in general for people from Cornwall?

Yes, I have no idea. [laughter] The people of that culture and their interests and their ideas and so forth are very interesting, because they are the ones that came up with the imaginative idea of the little people that live in the mines and [are] commonly referred to as Tommyknockers.

That's a well-known story among miners, right? The little spirits that live in the mines.

Yes, that's right.

Yes. But you laugh when you say that. Is that something that you believed in or don't believe in?

Oh, no! [laughter] No, I don't believe in that at all. But, I think, it interests me tremendously. And in a dinner meeting we had one time of the AIME [American Institute of Mining, Petroleum Engineers], why, one of my cohorts and his wife came up with a program where he was the Tommyknocker. And they put on a pretty good program. [laughter]

So it brings a lot of humor, if nothing else.

Yes, that's right. Yes.

I want to go back to your work at the mill and talk about some of the technical aspects of it a little bit more. Tell me, what was the source of the water supply in the Cord Mill? Do you know where the water came from for that mill? It was pipelines that were already present or . . . ?

I have no idea. A very good question.

But water was not a problem.

No, water was no problem.

OK. What about living conditions? Was water also available to you in your tents and so on, or did it go directly to the mill?

We must have had some shower facilities somewhere, and I have an idea we had our shower facilities in the mill. But there was water somewhere available to us, but we did not have running water in the tents.

So it sounds like maybe the water just went to the mill, and then . . .

I suppose they used outhouses there for the tents. If you wanted water in your tent, you carried it there. But I would think that the shower facilities were probably in the mill. I don't really recall that. There are a few gaps there in my memory.

What about transportation? You said everything was within walking distance while you were there. Did you have a vehicle there with you?

Oh, yes. Yes, I had my own vehicle there.

Do you remember what you were driving at the time?

Yes, a 1936 Pontiac. [laughter]

OK. It could make it up that hill? That's a pretty steep hill.

Oh, yes. Yes, to the mill I didn't think was much of a hill.

Wasn't that bad. And what about the transportation that was used in the work, getting the ore from the mine to the mill? How was that done? Do you remember that? Am I asking you all the wrong questions? [laughter]

You've asked me the wrong question there, because this had been bothering me for a long time, ever since you first mentioned that property. I can't recall how the ore got to the mill. And this is something that I've got to talk to Gerry about, and I mentioned it to a lady there where he lives that I've got to talk to him about something; that's one of the questions . . .

So maybe we can come back to that.

Yes. I would like to come back to that, because this bothers me. Completely ignorant about how the ore got to the mill.

That's good that we have someone else that you can talk to about it, though. Maybe it'll start to come back when you two visit about it again.

Yes, very fortunate that I have somebody, because, you know, the people that I remember that worked there, they're all dead now.

Yes, because that was in the 1930s.

Yes, 1939. Quite a while ago.

That is quite a while ago, all of a sudden, isn't it? [laughter]

Yes! [laughter]

Do you remember what the pay was to work in that mill?

Yes, six dollars a shift.

A shift, so six dollars a day?

Six dollars a day. And that was pretty fair wages, because I remember my sister-in-law, who was a registered nurse, I was talking to her about this. She said, "Well, that's pretty good. That's what I make." Yes, it was in 1939.

So those were good-paying jobs in 1939?

Yes, yes.

OK. Did that pay include your room in the tent house?

Oh, yes.

Did you pay for your food separately?

I don't know.

Because you had a wife. Was she still living in Reno during that time?

Yes, my wife was in Reno. And on long breaks, why, I would come to Reno.

So if you had two or three days, you could get to Reno and back.

Yes. Yes.

And was the money that you were earning part of what was contributed to the household here?

Yes. Oh, yes. That was our principal income, actually.

OK. She wasn't working at that time?

She was working, but I was earning more than she was by far.

OK. And the six dollars a day, that was more than what people were earning in the mines; is that . . . ?

No.

No. It was the same?

No, in the mine they would be earning about the same.

Was there other prospecting going on in the area, or was it pretty much focused on working the known mines?

No, there was no exploration going on in that area at that time. And the only [other] mining operation going on was the Sunshine. The Mary Mine and the Sunshine was the only thing that actually operated. I don't know about the Chiatovich Mill or if the mill was actually operating then.

Did you spend much time in Silver Peak itself?

No, there was no reason. After all, a place like that, unless you're a barfly, why, then there's no reason that

MILLING SYSTEMS AND EQUIPMENT

I WANT TO START today just by asking you a couple of questions from the previous tapes. The first one is, could you explain “changing rooms” and the need for hot showers, both in the mines and the mills?

Well, in both cases, when a man got off shift or finished a shift, well, he was somewhat dirty, and it was necessary for him to clean up. And in all cases the mine supplied shower facilities. Now at the Mary Mine, at the mine itself, there were shower facilities for the men working underground, and at the mill there were shower facilities in the mill for the men when they got off shift in the mill. And, of course, they just took their shower and didn't have to go very far to where they lived.

OK. Was it entirely because they were dirty, or were there some health reasons beyond just being dirty from the work that they were doing?

Well, it was entirely for the fact that a man is filthy when he comes out from underground and when he's working in the mill.

Sometimes he's working rather strenuously in a mill. If they have a spill and he has to do a lot of shoveling or something like that. That's the reason that a man just has to have a shower after that work.

OK. I was just wondering if there's any need for the shower because of the changes in temperature. You mentioned earlier that it's warm in the mines, and then they might come out and it would be wintertime and cold. And would that be a health threat to them?

Yes, that's a good reason for a hot shower when you're working underground, because when you're underground the conditions are relatively warm, and in the wintertime, of course, it could be snowing outside. And it's quite important for a man to have a hot shower and sort of rehabilitate himself before he goes out.

Get cleaned up and get his body temperature stabilized and so on. So those were typically provided in both the mines and the mills.

Oh, yes. Everywhere the company provides those.

OK. And since you lived in tents, you didn't have showers in your room.

Oh, no, no.

So this was kind of a community shower area.

Yes, yes. At the mill, the showers were in the mill. At the mine, they would have had what they call a "change house," where you change from your grubby underground clothes to your street clothes and take a shower in between, of course.

OK. Do they have lockers there or somewhere where people could leave their street clothes?

Usually, they have either lockers or some means of hanging up your clothes.

OK. A second question that I have is that we've mentioned several systems that were used in milling, and we need to have a brief description about each of them. Could you go through and tell me about flotation, amalgamation, and gravity concentration?

Flotation became rather important in the late 1920s or early 1930s, and, actually, the original name is froth flotation, whereby certain chemicals and air are added to the pulp, and the air facilitates the formation of bubbles, and the chemicals, of course, promote the bubbles. And the gold and silver minerals adhere to the bubbles. Or it could be copper—gold, silver, copper, or whatever minerals you're after—adhere to the bubbles and rise to the surface, and then they have a means on the machine to scoop that froth off. And that, of course, is then filtered and dried and shipped to the smelter.

Would the flotation system be used in conjunction with the cyanide system, or is it used separately?

Yes and no. The flotation system can be used separately or in conjunction. At the Cord Mill it was used in conjunction. There, the flotation concentrates, instead of being shipped, actually had their own cyanidation process whereby the cyanide solutions dissolve the gold and silver in the flotation concentrates and eventually went through a bag zinc precipitation system and then to smelting on the site.

So that was still fairly new technology, even in the 1930s when you were at Cord Mill then, the flotation?

Oh, yes.

Only ten, fifteen years.

It hadn't been around very long after all, but it was a very common method. It was used almost everywhere. Well, just like so many new systems coming in, why, in the 1930s they thought the flotation was the answer to all our problems. Of course, it wasn't. But anyway, flotation was used very extensively in the early 1930s.

OK. And you said it wasn't the answer to all the problems. Were there certain situations where it just didn't work?

Well . . . or may not float as well as the people thought it should. That was one of the problems.

What about amalgamation? Give me a definition of that.

Amalgamation is an extremely old system whereby the gold pulp or slurry is put in contact with mercury in one way or another, and the gold and silver—*free* gold and silver that is—adheres to the mercury and forms what we call an amalgam. And that amalgam is collected, either by gravity or on silver plates, and then it is put through a distillation process where the mercury is driven off leaving the sponge of gold and silver behind.

I see. OK. And was that used in conjunction with the cyanide process or not?

It could be used, yes. If you had free gold, it would be very logical and almost imperative that you used amalgamation to retrieve the free gold, because cyanidation does not work very well . . . does not work at all on coarse gold, because it's too slow a process.

I see. Was the amalgamation a part of the Cord Mill or was it not?

I believe amalgamation was used somewhere in the Cord Mill but not extensively.

More was sent to the flotation system?

That's right. It might have been used as an amalgamation trap somewhere. But I know very little about amalgamation being used at the Cord Mill.

OK. What about gravity concentration? Give me a definition of that.

Well, gravity concentration was used more when the desired mineral is concentrated, because it is heavier than the gangue mineral and, therefore, by panning or shaking tables or sluice boxes or something like that, why, the heavy minerals are retrieved.

So that's the idea behind panning for gold?

That's exactly the principle. Panning is a principle that's used in the concentration processes.

You also mentioned a piece of equipment at the Cord Mill, the rake bowl classifier. Could you tell me something about that? Was that an ordinary piece of equipment or was that unusual?

Well, it's the combination, you might say, of two different ideas. A rake classifier is whereby the coarse material, because it sinks to the bottom more readily, is gradually raked out of the bottom or the lower part of the classifier and goes back to the mill for regrinding. Well, combine that with a larger bowl, such as eight, ten, twelve feet in diameter at the lower end of this rake classifier whereby you have a lighter situation with your pulp. And the heavier, coarser material sinks to the bottom. And then, eventually, the rakes pick that up and take it back to the mill.

A bowl classifier is something like a thickener, you might say, whereby there are rakes at the bottom that move very slowly, and as the heavy particles sink to the bottom, these rakes pull them into a central spot where a pump pumps the slurry to some other part of the mill. A bowl classifier is something like that.

It's a process for separating the two different sizes of material.

That's exactly what it adds up to. The principle is to remove the coarser particles that may require finer grinding and get them back to the grinding mill.

Since it was at the very end of the last tape, I'd like you to talk about . . . you were at the Cord Mill for about three or four months. Did you spend any time in Silver Peak, the town?

I went through Silver Peak on occasion, but to my knowledge I never actually stopped in Silver Peak except, at one time, I stopped at the outskirts of Silver Peak to visit an uncle (my only uncle by the way) who was living there and working at a nearby mine. And, to my knowledge, this is the last time I saw the man.

You told us a little bit about Uncle Johnny, and he was known as "Moonshine Johnny," and your visit with him, but could you describe where he lived?

To the best I recall, it was a small cabin on the outskirts. [laughter] I don't know, maybe a ten-by-sixteen cabin or something like that at the most. And he seemed to be very happy there.

Was it a wood cabin?

Oh, yes. It's not a tent house. It was actually a wood-frame cabin.

Was it something he rented, or did he own it?

Oh, I have no idea. He undoubtedly rented. There was no reason for him to own a cabin.

OK. Because you called him a ten-day miner. He moved around?

That's correct. He moved around quite a bit. I will admit that this time in his life, why, he probably settled down a little bit, and

he probably worked at that mine longer than he usually worked at mines.

Yes, but it still would have been unusual for him to have owned this.

No reason whatsoever for him to own property.

OK. He died in that area. Do you know if he's buried there in Silver Peak?

To the best of my knowledge, he must be buried in Goldfield, because he died at the hospital in Goldfield. See, Silver Peak would be in Esmeralda County, and, therefore, he went to the county hospital. As I understand, he went to a county hospital in Goldfield and died there.

Working at the Cord Mill seems to have left an impression on you. Can you tell me what it was about that experience in your career that was important to you?

[laughter] As best I recall, one thing that struck me is the first time I had experience with a large piece of equipment that was too large to be easily handled on the roads for transportation, being cut in half and then welded back together again as one piece. That was the rake bowl classifier. It came from the Weepah Mill. I don't know how long Weepah Mill was operating. The discovery of Weepah was made in 1927, and when it was shut down, I don't know.

You had heard of this before, of cutting equipment in two in order to move it. Is that correct? Or had you not even heard of it before?

I don't think I even heard of it before. Since then I've run into all kinds of things . . . large pieces of equipment being cut and rewelded together, but this was a new idea to me.

OK. How large is this piece of equipment? If you had to describe it, is it as big as your house, or is it as big as this room?

Oh, no, it's about twenty to twenty-six feet long and as wide as about twelve feet.

And so, when they cut it in half, was it the length that they had to cut in order to move it?

It was rather long. Yes, they cut it in half crosswise. In other words, they cut the length in half.

And then moved it on two trucks?

Yes, apparently that's what they did. The fact is that it was a rather new idea to many people there. They thought it was a novel situation.

OK. What else impressed you?

Well, of course, I was particularly impressed by S. Power Warren's idea of transferring sands from one tank to another and thereby increasing the possibility of good gold recovery. It was absolutely an innovation. I don't know of it being done before or after that. I was impressed by Mr. Warren's knowledge of the metallurgical industry. That's it, I guess.

Did you get to know him pretty well while you were there?

Oh, just fairly well, and following that experience I met him at a few meetings years later. Another thing I appreciated about the Cord Mill is their system of pumps. All the pumps were in the same place; it was very easy to get at them and very well designed, planned.

And he, S. Power Warren, was the one who designed it. Is that correct?

Yes, definitely. He was the one who designed it. He came up with the idea. Where he got it, I don't know.

I don't think there was anything else. [laughter] Maybe, one thing that bothered me is that the time I was there I never did get up to the mine. [laughter] The Mary Mine.

Which was fairly close, right? It was right nearby.

Yes, it was only a few miles away, you know, but I never had an occasion to get there.

You would have liked to have seen it inside, would you?

Oh, yes. I would have liked to have seen something about what they were doing there. And the other thing that impressed me in that area is that, below the Cord Mill is an old volcano crater which shows up in all pictures that you have of that particular area. And my partner and I climbed around there quite a bit. It was interesting to us to imagine just how the lava flowed out. And you could see, looking at the remains there, just what happened. One side of this crater gave way, and the lava flowed out over the flats.

Yes, you'll be interested [in this]. When I was there, one of the people at the Mineral Ridge Resources told me that volcano still shows up as hot on the map from satellite mapping.

Oh, yes, it would.

Yes, it's fairly new in terms of earth age.

Oh, yes. Yes, it is. That's right. It's relatively young.

It would have been really interesting.

Yes, you go out there; it looks like it might have happened a couple of weeks ago or something. [laughter] And it would show up in photographs very readily, because here you have a bland

desert area, just absolutely flat, and right in the middle of it is this volcano.

Yes, because this volcano is not part of the mountain range. It's separate.

Oh, absolutely not. No mountains near it at all.

CAREER AS MINING ENGINEER AND GEOLOGIST

***L**ET'S TALK about where you went from Silver Peak, especially some of your experiences in Nevada. You had a pretty long career in Nevada mining.*

Well, first from Silver Peak I went to Northern California on a little gold project that we tried there for a few months. And from there (I guess, it was about 1939 or 1940) I got a job with the department of education in Carson City teaching prospecting classes under what they called their vocational education department. And I taught these classes for a few years, and they were stopped very suddenly by World War II. I remember so distinctly having taken some members of the class out to look at some mining properties and prospects on that December 7, 1941. And when we came back, the first person I dropped off, why, his wife came out and said, "The Japs have just . . . bombed Pearl Harbor." [pause]

That was an emotional thing for you.

Yes.

Tell me why that was such an emotional thing.

Well, at the time I didn't think of it as being so emotional, but when I think back about it, why, it . . . it definitely was an emotional experience to many people.

Yes. How did it affect you?

At that time, I . . . well, it was a terrific shock, of course, and you're wondering what's going to happen next. And then the . . . the extreme caution of not having your lights exposed at night and covering up all your windows with craft paper so that the light could not shine out. And I remember so distinctly covering the windows in the building that I was using to teach the prospecting classes in Fallon at that time. And then, of course, right after that, why, they needed mining engineers and geologists very badly to appraise mining claims—to determine what damage was being done to the claim holders. And that's when I was, more or less, "recruited" you might say, or ordered [laughter] to stand in line with them.

Were you in the military, or you were just . . . ?

Oh, no. This was strictly civilian.

A civilian government job?

Yes. Yes. It was under the war department.

OK. And when you say, "what the damage was" . . . tell me a little bit more about the job.

Well, the damage would be that for the prospectors, because we were talking about the claims on bombing and gunnery ranges. The prospector could not go onto his claim to do any work. Therefore, there was some damages due to him.

So the government was essentially taking that land back?

Absolutely, taking it back temporarily at least. So, many places where people thought they had some potential, they could not go in to determine that potential.

OK. And what was your job specifically? What did you do?

Well, we would go onto these mining properties and list the improvements that had been made and, as best we could, evaluate what the mineral potential was for that property and write brief reports on this. And that in turn was taken to the real estate people in the same group, and they would negotiate with the owner as to what damages were due.

So your assessment was, at least, part of the decision on what was due to the miners?

That's correct, yes.

So you went from teaching prospecting to working for the war department. What happened then? How long did that go on? Because the mines and the mills were being shut down. Mines all over Nevada.

Yes. L208 stopped all gold mining.

What's L208? Was it legislation?

L208 was their governmental It was not actually legislation. I don't know whether legislation, or it might have been a presidential order. I don't know what. But anyway, [it was through L208] whereby most gold mines were shut down, because the labor and the materials were needed elsewhere.

OK. So that came along about the time that you were appraising this land or before it?

I don't know. In that general time period.

So when you finished with that, working for the war department, what did you do next?

Well, I worked in a small mercury mine in northern California for a few months. About that time, my brother, who was living in Southern California, lost his wife, and I decided to go to the Los Angeles area to be with him for a while. And, of all things, I worked in the shipyards for a while. [laughter]

What did you do there?

Oh, it had something to do with the determination of how much in the way of munitions could be stored in certain compartments and was it logical. And then I finally realized that I best get back to Nevada. And I was able to get a job with the U.S. Bureau of Mines drilling iron deposits and one fluorspar deposit in Nevada. And after working for the U.S. Bureau for a few years, why, I had the yen again to go out on my own to try to see what I could do, and I worked . . . I prospected, you might say, and worked in tungsten. Actually, we found a little tungsten ore, and we milled at Bishop, California. And following that, why, the Nevada Bureau of Mines was interested in someone that had a little writing experience to work with them. And my writing experience, of course, had come from my work with the U.S. Bureau of Mines where I wrote three different publications on my work with them. That was on iron ore as well as fluorspar.

Then, when I was with the Nevada Bureau of Mines, I first studied the mining districts of Nye County and wrote a bulletin on that. And following that, why, the Nevada Bureau of Mines and the U.S. Geological Survey started a cooperative agreement to study the iron deposits in Nevada. And, of course, I'd already had some experience with iron ore deposits, so I fit into that pretty well. The goal was to find out more about the potential of iron ore in Nevada and, therefore, help companies that might be interested in mining iron ore in Nevada. At that particular time, Nevada iron ore was particularly desirable for the open-hearth, iron-ore smelting system being used in the Midwest. It was, therefore, very logical that this project go forward. We first studied the ore de-

posits out of Lovelock, which were very important, and at that time ore was being shipped to the Midwest for the smelters.

For what purpose? Why was there such a demand for iron ore at that point?

That particular iron ore we had in Nevada was a high grade magnetite ore that was over 60 percent . . . or right around 60 percent iron—was heavy and, therefore, in the open-hearth system, it would sink readily in the melt and help oxidize impurities.

Say a little bit more about that. It helped oxidize impurities?

In the iron ore. The open hearth system is principally to make the blast furnace process into a pure iron.

OK. And Nevada had high quality iron ore, [which] was very desirable.

Yes, helped that a great deal. Oddly enough, that system is not being used nowadays.

Really. What happened to it? Do you know?

Well, now they use an oxygen-lance system. They put the oxygen into this melt with oxygen lances instead of using the ore. It's an entirely different process now.

So Nevada's iron ore is not in demand like it was when you were working on it.

No, not for that purpose. [laughter] At the time this work was going on out of Lovelock and some mining was done in iron ore, the iron ore, besides being shipped to the Midwest, was also being used as ballast in ships. And it was also being used as a uranium shield. And I forget now just exactly how that was used, but the concrete made out of high grade iron ore makes an extremely good radioactive shield.

I see. So the beginning of nuclear energy created a demand for the iron ore, too.

That's correct. That's all I can recall about that particular part.

The cooperative effort between the Nevada Bureau of Mines and the U.S. Geological Survey was started in Lovelock, and we made an extensive geologic survey of that area and then went elsewhere in the state, and several small deposits that we worked on were continually worked for a long time after that for iron ore.

OK. And did you go beyond Lovelock? You went around all of Nevada?

Oh, yes, we went into northern Nevada and an iron deposit near a Junco, Nevada.

Where is that located? I'm not familiar with that.

It's on the Western Pacific Railroad, north of the Black Rock Desert. And there were a couple of other places in the state—one out of Wabusca that was also being worked and the one right near Gabbs, Nevada. That's a rather small deposit but a very interesting one.

Interesting for what reason?

[laughter] Well, it was interesting to me, because there's this one particular mineral referred to as "mountain leather," which is a by-product . . . is an outcome of the metamorphism of a ferromagnesium mineral. And this mountain leather looks just exactly like a chunk of leather. And that's the only place that I ever found the specimen myself. It occurs in many places, I presume, but I found it there, and I thought that made it very interesting to me.

That is interesting—rocks that look like leather.

Yes, actually, a rock finally ends up being something that's just like a piece of leather.

Feels like leather?

Feels like leather. [laughter]

That is amazing. So you were all over northern Nevada then with this iron ore project.

Yes, yes. I got around northern Nevada quite a bit on that project.

And published three documents from that?

Yes, I think, there are three different parts under one name. The first one was called, *Ore Deposits of Buena Vista Valley*, and the others are *Ore Deposits of Nevada*, parts one or parts something or other.

What happened after the Nevada Bureau of Mines job? Where did you go from there?

[laughter] Oh, because of my experience with iron ore in Nevada, I got acquainted with the Ford Motor Company people that came out here looking at these deposits. And this man said that in a few months they might have an opportunity . . . might have an opening for a mining engineer geologist in the Upper Peninsula of Michigan, which is the Lake Superior country. And lo and behold, that developed, and I told him I was interested because I went into mining because I wanted to see various, far parts of the world, and I hadn't gone much farther than Nevada so far. [laughter] Well, I got to California with the war department. I got into New Mexico, too.

Then, in January of 1955, why, the family and I moved to Iron Mountain, Michigan.

And how long were you there?

Almost fifteen years.

And what was your job there?

To look after Ford Motor Company's mineral lands in the Upper Peninsula. And old Henry Ford wanted to be self-sufficient in everything, including iron ore, and he also wanted to be self-sufficient in the hardwood that was being used in the station-wagon bodies at that particular time. Therefore, he bought up a lot of lands in the Upper Peninsula for the hardwood as well as for the iron ore potential there. And they actually mined iron ore there. My first job when I got to the Upper Peninsula of Michigan was to shut down and dismantle what was left of one of the iron-ore mines there, because it was no longer profitable. And then I explored for iron ore for them in the Upper Peninsula. And one thing lead to another, and I started looking for other things on their lands, too, but, although I found some good leads, why, the company was not particularly interested in prospecting. Almost the exact words that they told me. So, eventually, they decided to move my office to Dearborn, Michigan, and having had six months experience in Dearborn previously, why, I decided that that was not for me, and they gave me the opportunity for early retirement, which I took immediately.

What didn't you like about Dearborn?

Too many people, and I don't necessarily like the way large corporations work.

I see. What about them? Can you say? If you had to name one thing, what [would it be]?

Well, the one thing that I noticed—there's too much of a competitive attitude among the employees instead of a cooperative attitude to get the job done. And that, I could not stand.

Had you run into that in Nevada in your mining experience, or was Ford Motor Company the first time you saw that?

No, that was the first time I saw it. And although you will find that, maybe, in many companies, no matter where you are, why, in my mining experience I had not run into that. There was more of a cooperation to get the job done.

So men in management, workers and management, everybody was working together in Nevada from . . .

Well, it appeared that way to me. Yes, we were all working pretty much in conjunction with each other. From there I worked with the Hanna Mining Company for about three years No, I'm sorry, for about six or seven years. And three years of that were largely in southern Arizona, and three years were in the state of Maine, where we were trying to find nickel copper reserves on a deposit that had been known for over a hundred years there.

Tell me what brought you back to Nevada finally.

Well, finally, Hanna Mining Company didn't need my services and gave me the opportunity for an early retirement, which I took then. And I had a friend in New Mexico who was a land surveyor, and being as how I had spent much of my career in land surveying, why, I worked with him for a while. But at the same time I was doing some work for the Arizona Department of Mineral Resources. I soon found that I couldn't be doing both. So when I finished the job with the Arizona Department of Mineral Resources, I decided I'd look into Nevada. I made one trip out here, and I found that I had not lost all my ties to Nevada by any means, and I came back to Nevada.

I want to go back just a little bit. You touched briefly on when you were teaching prospecting. Tell me a little bit about those classes and how that was set up.

Well, the classes were set up for three or four weeks at a time. And when they were set up for three weeks, I would just teach mineralogy, more or less, and a little bit of geology and the study

of rocks with the students. That's all it amounted to. But if it was set up for four weeks, well, then I also taught them the rudiments of fire assaying. And that was very interesting to me, because that was something I had done in the past; I had done quite a bit of fire assaying.

Describe that process.

Oh, fire assaying? It's where you take a known quantity of ground pulp and mix it with certain fluxes and smelt it in a crucible in a small furnace. And in this flux or mixture you have also put a lot of litharge, where you ended up with about a twenty-gram button of lead, and that lead would contain your gold and silver values. And that is put back in the furnace in what we call a cupel that absorbs the lead but leaves the gold and silver bead behind. Then you weigh the bead, which is both gold and silver, and dissolve the silver out of it with nitric acid leaving gold which you weigh to determine the gold content. And being as how you started with a known quantity, by certain formulae, it's a very simple matter to determine how much gold you have per ton in that ore.

OK. That's a process that's been around for . . .

[laughter] It's been around for . . . maybe not to Agricola, but it's been around for a long, long, time.

Centuries, is that correct?

Yes, I'm sure. yes.

And it sounds like you took the students out into Nevada.

Yes. I liked the field trips very much, because there I could go right on the ground and look at somebody's prospect and explain things more easily than I could in the class. The students liked it, too.

They could really see what you were talking about with the different rock formations being together and so on.

Yes, yes. In the classroom I would have all kinds of mineral specimens to show them and rock specimens, but it was a lot easier I found that the students who were all adult persons in various vocations in life—carpenters and whatever—were very much interested in this, but I could teach them more out in the field than I could in the classroom.

Were these evening classes? You said they're adult . . .

Yes, they were all evening classes.

About how many students would you have in each class?

Oh, you'd have maybe a dozen, and sometimes you'd go . . . maybe forty or fifty students, you know. I taught these classes here at the university, too, for adults. And there, why, we had quite a few students, actually.

OK. But these were all people who were going to do mining as an avocation rather than a job?

As an avocation, strictly an avocation. It was not meant to train miners or not to train people that would have to understand a lot. And if they were professional people in the mining industry, this was not for them at all.

Because it was very basic, just so somebody could get started.

Extremely basic, yes. It was to get people interested in prospecting. And the idea is that, after all, if people get interested in prospecting and find something, it means a great deal to the economy of the U.S. as well as the state.

Because if they prospect and they happen on something that really has some value, then they would be able to establish a mine, sell it Is that the process?

Oh, yes. And then the taxes would develop out of that to help both the U.S. government as well as the state, wherever they are, and the counties, of course.

So it was training more people to be involved in the business of mining but in their spare time.

Yes. Strictly an avocation.

OK. Since you came back to Nevada from all over the United States—Michigan, New Mexico, and so on—have you worked for a company, or have you been doing your own projects?

Oh, no. It's exclusively consulting work whereby I'd work on, maybe, evaluating prospects or getting some ideas, or it might be land-records work, something like that. Just whatever's necessary.

Do you do any work with the university still or have you since you came back?

No. I have done no work here, no teaching at the university.

But you're very active in a couple of associations. Is that correct?

Oh, yes. I'm active in my professional organization, which is the Society of Mining, Metallurgical, and Exploration Engineers, and part of the American Institute of Mining, Petroleum Engineers. [laughter]

They've changed the name right. [laughter]

Yes, they have.

And is there a local chapter to that?

Yes, there is a local section here, of which I was secretary for a long time. Now they sort of call me secretary emeritus, and I help do quite a bit of work with that organization all the time. And one of the outcomes of that group is to put out a historic mining calendar every year, which is a fundraiser for scholastic contributions that we make. And that takes a lot of my time.

Just putting together the calendar, finding the photographs, identifying, and so on.

Yes, yes. You're almost to the bottom of our photographs, too. We've got to find a new source.

I think we've covered everything that I need for the Silver Peak history. I really appreciate your contribution to this.

I'm sure happy to help. I wish I knew more about some of the things that you'd like to know, but I just don't.

Well, the parts that you do know have been very valuable, and I appreciate it. Thank you.

Glad to help.

PART TWO

[NOTE: The first interviews with Victor Kral were conducted for the Silver Peak history project. Later, I returned to complete his oral history as part of the statewide mining oral history project.]

MACKAY SCHOOL OF MINES

*T*ODAY IS APRIL 21, 1997. My name is Victoria Ford, and I am here with Victor Kral in his home in Sparks, Nevada. We're going to be talking about mining in Nevada, and we're going to start with the Mackay School of Mines. Vic, let's start with how you got into college.

The principal of Reno High, whose name was Otis Vaughn, helped me a great deal to get started with school simply by going over my records very carefully and determining that I did have the necessary course work and grades to get into college. I don't know just who influenced me more to go to college. It might have been my associates. Other men or young people of my age probably influenced me to start college more than anything else. However, I guess I always thought that college was necessary.

Necessary why?

For economics, as well as being a well-rounded citizen.

All right. And so you came to Reno to live with your brother, if I remember correctly.

Yes, that's correct.

And were you living with him when you went up to the university?

Yes, I was. The fact is I lived with him during my senior year in high school. And then following that, I guess I got acquainted with a couple of brothers who were in civil engineering and that helped influence me to go to school. At that particular time I thought I would be more interested in civil engineering than anything else. You have to keep in mind that about that time in history, more or less, why, every young person that was interested in engineering was, for some reason or other, interested in electrical engineering. At that particular time, why, things were moving very rapidly in electrical engineering; therefore, we were interested in that. But it didn't take me long; because of my associations, I became interested in civil engineering.

What year did you start at the university?

I started at the university in 1928.

What was it about electrical engineering? What was happening in that field that was so exciting?

I think it goes back more to the early 1920s that electricity was becoming so important, that I and most of my associates were particularly interested in electrical engineering. It's hard for me to say just why, but I remember reading articles about a very important electrical engineer at that time whose name was Steinmetz, who was always pictured with a cigar in his mouth.

Anyway, one thing or another lead me into electrical engineering. I was fooling around with radio at that particular time, too—the simple crystal sets. And that's just the way I went on, just like so many of my contemporaries that were interested in engineering.

Engineering was my background and ambition—some type of engineering. And then, as I say, because of my association with neighbors in Reno, why, I started out with civil engineering.

What are some of your first memories of the university campus and your classes?

Well, of course, the first two years on the campus are much the same no matter what, particularly in engineering. It's difficult for me to recall my freshman year. I took English from Paul Harwood. He was a professor of English. My math courses were from both Searcy and Haseman. Then, my sophomore year I started in physics and chemistry; I got along fairly well in those courses.

Did you find the work difficult, or was it interesting to you?

Math was difficult. Chemistry was both difficult and interesting. The one thing that I recall about chemistry—I had a very good professor, Sears, who later was the head of the department. Anyway, well-known on the campus. One of his peculiarities—he would give the students an unknown, and they would have to determine just what it was. And they would come back to him and try to explain what this unknown was. If they were wrong, why, he'd kind of chuckle and laugh. And this really disturbed the students, because, after all, they had worked pretty hard on this material to have somebody laugh at them at the end. [laughter] It was not the right thing. There was another peculiarity about him. He was a good prof, but for some reason or another, when he set up his experiments—demonstration, experiments—they almost always flopped. [laughter] Something always seemed to go wrong. I can only say that he didn't do enough work ahead of time to make sure that they would work. We all . . . I particularly felt sorry for the guy.

But it was entertaining at the same time. [laughter]

Oh, very entertaining. You could expect that it would fail. [laughter]

So your first two years were really getting the basics out of the way, and everybody in any branch of engineering took the same classes.

Yes. All engineering students took exactly the same courses, yes.

And you started out thinking in terms of civil engineering. Where did that change for you?

I suppose it was after my freshman year in college. I had an opportunity to get a job at Ely at the Ruth Mine, and so I went out there and ended up underground. It was the first time I had ever been underground, ever worked underground. It was interesting to me, and that's when I became interested in mining.

And the mine at Ruth was what type of mine?

Well the mine at Ruth, the particular shaft that I was working in, was called the Star Pointer Shaft. It was underground for copper. And at that time the price of copper was pretty good. I don't recall what it was, but it was good. And it was there that I got better acquainted with some of the students at the Mackay School of Mines who were also working there. I appreciated very much the fact that the management made it possible for us young people to get a pretty good, broad view of what was going on in the mine.

Can you describe a little bit more about what kind of experience you were able to get there?

The mine was a caving operation, wherein, the ore is purposely broken and drawn from chutes so that it caves by itself. It is ordinarily not necessary for any blasting to go on. The material is more or less soft. And it's a very cheap method of underground mining—somewhat dangerous, because the ground is continually moving. I remember so distinctly that in many parts of the mine the timbers were coming in to the point where you had hardly room to move around. That required most of the work there—to completely, con-

tinually replace these timbers. That is characteristic of the caving system.

I remember so well, moving back in a drift, and my ear touched the trolley wire and gave me quite a shock. And this was common. Everybody that worked there occasionally got a shock. The voltage was 250 volts or more of direct current.

After working with a timberman for a while to get acquainted with what's going on in the mine, they took me, as well as other young people who were rather agile, and put us on the ore trains. I was working as what you might term a brakeman on the ore train. I would signal the motorman when to move the cars ahead and spot them so that the ore chutes could drop the ore properly into the car. The signals were given by taking about a one-foot piece of pick handle or a shovel handle and tapping it on the wire. This carried the sound very readily to the motorman. Therefore, we were referred to as the wiretappers. [laughter]

That later became a negative term in the 1970s—wiretappers.

[laughter] Yes. Accidents happened occasionally there and . . .

Were there any while you were there?

I don't think there were any mine accidents while I was there. You have to keep in mind that this was the summer of 1929. The Ely area was in a boom period; life was cheap. I recall one of the men that I worked with there—a single man—his body was found at McGill on the grizzlies. In other words, he had been killed—murdered—and his body dumped over the side of a bridge going over the car tracks, and it fell into the cars. And when the ore was dumped at McGill, why, his body, of course, ended up being on the grizzlies there. I don't suppose the perpetrator of the murder was ever found. Probably not a great deal was done about it.

As I understand, from talking with people in that area, it wasn't but a few years before that, men wore sidearms for protection on the street. In other words, Ely was a rough and tough place at that time.

Did you personally see that when you went into town or into Ely? Or were you mostly occupied in your work and away from that rough and tough atmosphere?

Keep in mind that I just barely turned eighteen at this particular time, and the open cribs were common in most places where there was some money, which was the case in Ely.

And by open cribs, you're referring to prostitution?

Prostitution, yes. And to a youngster, it was always interesting to walk down the street where these prostitutes were—more the curiosity than anything else. But I recall so distinctly that some of these ladies were so heavily painted up that, for some reason or other, they just scared me a little bit. [laughter] After all, I was just a kid.

Had the opposite effect of attraction on you?

Yes, it was a very odd attraction. I can recall another little incident. My roommate and I thought it would be a novel idea to explode some dynamite out in the open. And it was very easy for anyone working in the mine there to stick some dynamite in their pocket and carry it out. No problem at all. Anyway, we took a half a stick of dynamite and hung it on a fence wire and set it off. And I remember so distinctly how loud that was. You have to keep in mind that dynamite right out in the open like that, exploding, is going to make a terrific noise—and it did. [laughter]

But did people come running? [laughter]

So far as I know, nobody paid any attention to it. [laughter]

So you were in an area that was really going strong in terms of mining in 1929.

Yes. Yes, it was. The price of copper was good; therefore, they were really trying to mine as much as they could.

How big an operation was at this Star Pointer? Do you remember how many miners were there?

Oh, it was pretty hard for me to say. I was working on what they called the ninth level, which was the principal production level at that time. And I would say there were, oh, about thirty or forty on that level.

How many of you were students?

Oh, there were four or five of us that were students there.

When you say the ninth level was the principal production level, were there other levels that were being worked?

I think there was a little ore coming out of one or two of the other levels, but, by and large, the other levels had been abandoned. We were drawing the ore from the ninth level.

How deep would that have been?

Actually, it was called the ninth level, but if I recall correctly, it was only between five and six hundred feet deep. An odd situation there was that hard hats were just beginning to come into play. Men were just beginning to wear hard hats. Some of them also wore a kind of a black rain hat, and the hard hats and rain hats didn't look a great deal different. I recall distinctly one young wire-tapper one time just fooling around and taking his little club and tapping people on the head that were wearing these hard hats. But he happened to hit somebody who was wearing a rain hat instead. [laughter] And the guy didn't like it.

Was that the beginning—the hard hats—of some safety measures that you began to see?

It probably was the beginning of safety measures, but there were not enough safety measures mentioned.

What did you see, compared to now? What kind of things were going on, in terms of safety?

There was one thing that I participated in that I should have been clobbered for when I was a youngster. Nobody said anything about it; maybe they didn't realize it. Sometimes a wiretapper, while the cars are moving, would move up forward toward the motor by hopping from one car to the next. And this can be very dangerous, because, as I said, in the caving system the ground is moving continuously, and some places the cap of the timber is down a little bit lower than others. And I remember so distinctly when I was doing this one time, as I'm hopping from car to car, my buttocks being hit by the timber as we were going through. This could be very dangerous, and nothing was said about it. The chances are that management didn't even realize how foolhardy our young people could be.

Management and the U.S. Bureau of Mines, cooperatively, were very concerned about underground fires. And while I was there, what you might call a fire team from the U.S. Bureau of Mines stopped there and gave a course in using self-breathing apparatus for fighting fire. And it sounded interesting to me, so I took the course. I'm glad I did. The company was very cooperative. They paid for our time for taking the course.

Can you describe the self-breathing apparatus?

At that time there were two different types of self-breathing apparatus: one called the McKay and the other Gibbs. What they amounted to was a large apparatus that you wore on your back, which carried its own oxygen and also carried a means of filtering the air that you breathe. Therefore, you are breathing the same air all the time, but oxygen was added to it, and impurities and water were being filtered out of it.

Did you use one of those when you were underground?

Yes, for training purposes we used these. And after you got pretty well acquainted with using them, why, they would build a

fire underground and give you various things to do. As an example, in the smoke conditions, you would be sawing timbers and possibly building a bulkhead to stop the fire. This was a good training procedure, and I appreciated everything I learned there.

They really were thorough in training you about how to deal with fires.

Oh, very, very thorough.

And was that one of the main safety problems, in addition to the caving? Was fire really a hazard in the underground copper mine?

So far as I could see, I did not detect if fire was a hazard. But you always have to keep in mind, you don't know how, but a fire can occur. You've got an awful lot of timber around there, and it's dry.

An interesting sidelight of one of these practice sessions—the superintendent of the mine, who was Charlie Steinbeck, came down to watch us working. One of the men on this team we called Frenchy, a kind of a humorous person—one would expect someone would play tricks on him. Anyway, Charlie Steinbeck, without Frenchy knowing anything about it, closed the valve on his oxygen just to see what would happen. [laughter] Well, obviously, Frenchy started perspiring and didn't know just exactly what the problem was. But anyway, it probably was straightened out without any difficulty. But I just thought to myself, that wasn't a very wise practical joke. [laughter]

No. It sounded like a dangerous practical joke. So as a student, you got to see the timbering, the whole caving operation and how that worked; you worked as a brakeman, worked on the ore trains. Anything else that you remember from that experience that summer?

One of the young men working and going to school and all and working this particular summer at the Star Pointer Shaft was Paul

Gemmill. I remember that there were three or four of us on the Fourth of July vacation period who decided to go somewhere. So we went to see the Lehman Caves area. At that time, the Lehman Caves had just been turned over to the Park Service. And tours were not yet started, but we drove up there, and we talked to the ranger about looking around underground there in the caves. And he said, why, he'd be very happy to show us through. He explained that the tours had not yet opened, and that this was one of the first days of the Park Service having any control there. But being as how he would be giving tours later on, why, this might be a good practice session for him. So he showed us through the Lehman caves, and we appreciated it very much.

That night the four or five of us, or whatever number there were, just built a bonfire, and we slept out under the stars. But around the bonfire, why, Paul Gemmill recited "The Cremation of Sam McGee," a well-known Robert Service poem. And I'll always remember that. I thought Paul did a great job.

He was the entertainment for the evening?

Yes, that's right. That was my first encounter with Paul Gemmill. After that, I met him several times and got pretty well acquainted with him.

I've been just reading his oral history. He did a lot of work around the Pioche area, is that correct?

Pioche, yes. Pioche was his home. He was the manager of Combined Metals there.

So you two met as students.

Yes, we met as students there, and later on I met him out in the field. That was about 1935 or 1936, somewhere around that time, while I was in that part of the state, and we had a good chance to chat then.

So some of the people that you met when you were a student remained work contacts all through your career, is that right?

Oh, yes, yes.

Some of these friendships that started at Ruth, Nevada?

Yes, yes. Well, one of the fellows that was working with me there, later on, for some reason or another, became a dentist. Another one worked for a clay products company in the Los Angeles area, and they had a very serious fire there, and I guess he over-worked himself or something. Anyway, he had a heart attack at this fire. Another one, I believe, worked in the northwest for the forest service later on. So I kept in contact with some of these people, yes.

In terms of time off that summer, was the main break the Fourth of July? Did you work seven days a week or shifts?

You work continuously. You work seven days a week, and the Fourth of July was the only time we had off. At a time when you changed shifts, sometimes you'd have a little extra time, and I don't recall we did anything special with that extra time, except maybe wander around the area there, that's all.

OK. So you spent the summer at Ruth, and then you came back to the university for your sophomore year, is that correct?

Yes. That's correct.

So then tell me a little bit more how your education went, because this is summer of 1929. What was happening with the stock market around this time?

Well, of course, it was the fall of 1929 when they had the crash, and I don't really recall too much about that. I helped finance my education by working in a grocery store, I remember, at that particular time.

So you were working and going to school the whole time all during college?

Yes. Yes, I was working in something all the time. It was an odd thing. When I left Ely to come back to school, why, I hitchhiked back. In my early days, hitchhiking was very common; I hitchhiked all over the country. And I got a ride by a young man who was coming from Utah, going to Reno to work in a grocery store. And I found out later that he would be one of the managers of this store. When I found this out, why, I got a job working in that store in off hours while going to school.

So you're working and going to school as a sophomore.

Yes. School was kind of difficult for me at that time. For one thing, the physics that we took was a five-hour course. That meant five credits. You met every day. And I had a rough time with physics, because, for some reason or other, I didn't seem to find enough time to do my homework and study. However, I realized, and my fellow students all realized, that physics is a very important subject for anybody in engineering. I did the best I could, but somehow or other I didn't do well enough. I had to repeat some of my physics courses later on.

At the same time, we were also taking some rather tough mathematics courses from Haseman. And Haseman was an extremely fine gentleman, but very rough in class. He was known to throw chalk at students in the class. [laughter]

He would lose his temper in class?

I guess he did. He thought we were a bunch of dummkopfs! [laughter]

You laugh about it now. I bet it wasn't funny then?

No. [laughter]

How about your other professors? Was Haseman the most difficult? You said physics itself was difficult.

Oh, I had no problem with my instructors. Actually, I would say, in looking and thinking about my instructors, they were all very conscientious, really, very conscientious.

Could you name a few of them and just tell some of the things that you remember about them?

Well, at that particular time, why, I had Carpenter, of course, in some of my courses in my sophomore year. He taught mining methods, and he was conscientious. But actually, Carpenter, in spite of his broad knowledge about the mining business, why, Carpenter did not know mining methods as well as he should have, to be teaching the course.

Can you give an example of what you mean by that?

Well, the students in the class could realize when the prof got a little bit confused about his explanation of a mining method. And this happened a few times. Also, he had too much of a tendency of talking about methods that were way in the past and not getting into modern methods enough. I will say, though, that he's the one that brought up the subject of open-pit mining. Mining, as we were looking at it at that particular time, was beginning to change, and with the open-pit mining becoming so prevalent, it was very often not the mining engineer, but a civil engineer that ran the job.

And this was in the early 1930s? This was already true?

Yes, this was 1930, yes. That was just the beginning of when open-pit mining was becoming more important. Of course, keep in mind that at Ely and at Ruth, why, that open pit there had been going for many years. [laughter] In Utah, Bingham Canyon had been going many years. But now we have open pit-mines all over the state. We did not have them then.

So he was aware of that, as a new technology for gold mining coming into play?

Oh, yes.

But there were some other things that the students felt he wasn't aware of out in the field?

I just feel that, so far as underground methods are concerned, which were still being used, of course, that he really didn't know as much as he should have about it. Well, he just did not have that experience. Much of his experience was in metallurgy—operating and managing a mill.

Rather than the underground mining, actually being underground and seeing how that worked.

Yes. But that's all right. I still give the man credit for being conscientious and being very much concerned about the welfare of the students.

What about other instructors?

I think it was about that time that we took a course in mine accounting, and Couch taught that course and did a very good job also—very conscientious in teaching it.

Mine accounting is the bookkeeping end of mining?

Absolutely. The bookkeeping and cost accounting and so forth—very important in any business, including mining.

You noted that after the sophomore year there are other professors you would like to mention, but following your sophomore year, you had a break in your schooling. Could you explain what happened?

Couch, who was not only the accounting professor, but also the secretary of the school of mines, would arrange for students to go on particular jobs. And, of course, he would solicit work for them with the companies. After my sophomore year he arranged for me to get a job at the B&B Quicksilver Mine on Montgomery Pass.

And where is Montgomery Pass?

The Montgomery Pass is the pass over the Sierras between Mina and Bishop. I was in the process of putting my little 1926 Chevy Roadster back together again; and my friend, Gerry Hartley, who belonged to the same fraternity with me, happened to be out on the back porch when I was trying to put things together. He helped me somewhat, and that's when I sort of got acquainted with Gerry Hartley. I explained to him that when I got my car back together again so it would run, I was heading for the B&B Quick on Montgomery Pass.

He said, well, he was going to a mine not very far from there where his dad was operating, and could he have a ride partway? And I said, "Of course." So anyway, we set out for the B&B Quick, but after a while I decided, as long as he was going to a mine the other side of that, maybe I could get a job there. So, unfortunately, I never got to the B&B Quicksilver. I never, never saw it.

I went on beyond that to a mine that was about thirty-five miles north of Bishop, called the Lone Star Mine, and Gerry's dad was operating that. The operation in that particular case was getting ready to sink the shaft that, I think, was a 300-foot shaft, and they wanted to sink it down to the 400 level. So anyway, I was one of the first people, I guess, hired for that particular purpose.

So that was supposed to be for the summer between your sophomore and junior year?

That's what it was going to be, but the summer ended and the job continued. I thought, well, I had a job, and things were a little bit tough all the way around, so I thought I had better hold on to my job and go back to school later on. I stayed there, and I guess

by late fall or spring of 1931, I don't recall, why, that job petered out, anyway.

And so when you say that things were tough all around, the Depression had to be hitting pretty hard.

Oh, yes. The Depression was hitting. I remember that we would pick up miners wherever we could. And I remember going into Bishop and going to what we called "the jungles"—where these men were just getting by on their own, cooking a pot of stew or whatever—looking for miners.

The jungles was where the unemployed, homeless people were?

Yes, that's correct. It's an odd term that has a very definite definition meaning: in the woods or whatever was surrounding and being close to a town. Why, these fellows would make this their home, and they would get together and pick up whatever food they could and share it and cook it.

And help each other survive?

Yes, that's right.

And that's where you would go to get miners to help in Gerry's dad's mine?

Yes, that's right.

So the decision not to go back to school that fall must have had a lot to do with the Depression then—having a job and having some income?

Oh, yes, very definitely. I had a job, and I thought I better stick to it and pull together as much money as I could to help me later on. I don't recall just exactly what followed that, but anyway, I did finally go back to school.

Let me stop and ask you, too, about the mining. Now, you were at a small mine that Gerry and his father owned. Were there still other mining jobs around, though, during this time? Was mining one of the industries where you could find work during the Depression? Did you have any awareness of that?

It was difficult. There weren't very many. That was the only mine, the only place where there was any work going on around there, yes.

OK. So it wasn't like there was a great, wonderful mining boom that was drawing workers?

Oh, absolutely not. There was no mining boom whatsoever. They were tough times. I remember my pay was five dollars per shift, and that was pretty good for me. A hundred and fifty dollars a month—can't sneeze at that. [laughter] That was a lot at that time, yes.

That was a lot because some shifts in some other mines may have been only, what, four dollars a day?

Yes, that's right, three or four dollars. That's correct. And I can remember during my sophomore year when I was working the grocery store, I was averaging somewhere around twenty-five cents an hour.

So mining was a good job compared to working in the grocery store?

Yes, it was. Yes, absolutely.

And you could actually get a little bit ahead so you could go back to school with that kind of a job?

Oh, yes. Getting \$150 a month, why, it was pretty good. You could put some money away and go back to school. I'm trying to

recall just what I did after that, but I did go back to school the next year.

The Lone Star mine was an old lead-silver-gold mine that had had a little bit of past production. Pretty good grade. But they encountered a little gold ore, and that was the reason for sinking the shaft down to the 400 level, in order to pick up more gold ore. They didn't pick up much, but some of the ore that was taken out separately was later on milled, not by the same people that had it when I was there.

So it ended up at least making a living for the people that were working there?

Yes, somebody got something out of it.

1930-1931 is the year you worked at the Lone Star Mine. And so it would have been, what, the fall of 1931 when you went back?

The fall of 1931, I went back to school. That was my junior year and the senior year for my contemporaries—those that started school as I did in 1928 were graduating in the spring of 1932, and I was just completing my junior year.

Were there others who had to slow down because of the Depression?

It was tough. It was not very unusual for people to stay out of school, and it was pretty tough going to school, too, because money was scarce. I remember so distinctly that I had an awful time finding money for my textbooks. I had to borrow textbooks here and there and wherever I could, because I just didn't have the money to buy them.

You could pay the tuition, but the textbooks were beyond what you could manage?

At that time there wasn't any tuition, you see. A Nevada resident didn't pay any tuition. However, there were some fees, but they were very low.

OK, so it was more a matter of being able to survive without income from work in order to go to school and buy your textbooks?

That's correct. Your textbooks were the big cost. And I remember so distinctly, there was one textbook used in mineralogy class that I never did get. I just borrowed it. And, finally, about five or six years ago, I found somebody that had a copy of this book, and he gave it to me. [laughter]

So now you finally have it. [laughter]

I finally have a copy of that book! [laughter]

Well, no wonder some of those courses were difficult, if you didn't have the textbook.

Yes, that's right.

Were you living still with your brother during that time?

Yes, I was living with my brother at that particular time.

Do you have any specific memories of your junior year, of the courses that you took? You were coming back, now, to school with experience in an underground copper mine and an underground lead, silver, and gold mine, so you had quite a bit of experience.

Yes. Yes, I had some experience, which helped me somewhat in my class work, but it was that particular year that, I think, I had to go back and do some extra work on physics courses. I also took some additional geology courses that particular year.

And then what happened after your junior year?

The year of 1932-1933, I worked at various jobs. I surmise that I just did not have enough money to go to school, and I was able to start out with a job. The fall of 1932 was probably when I was in northern California working with a company that was rehabilitating ditches that had been used years back to supply water for hydraulic mining. I worked with them the summer of 1932, well into the fall.

And at that point you weren't able to go back to school?

No, I was not.

Were all the jobs using your engineering background, though?

Unfortunately, that one there in California was using no background whatsoever except the shovel. [laughter]

A shovel. And lucky to get it, huh?

Yes, absolutely. I worked for people that I heard about in later years. It was a company in Phoenix that was supplying the know-how, at least. I don't know where the money came from to rehabilitate this placer operation. That was very interesting, to work here where other placering had been going along, and every once in a while we'd find a pocket where mercury had been left behind. [laughter] We panned the mercury on a shovel. In other words, you use the shovel just like you would a pan and wash the dirt away and end up with some mercury amalgam. It didn't amount to anything. Anyway, it was interesting.

By the way, it was in this particular area that I was able to see some historic areas. Recall Bret Harte wrote a story on *The Outcasts of Poker Flat*? I was able to see Poker Flat. [laughter]

Because you were working around that area.

Yes. Yes. When that job was finished, I worked at various jobs. I recall distinctly, one time there were three of us. We were grubstaked and made no money except our food. We worked in a small prospect, about a hundred miles northwest of Winnemucca in the Leonard Creek area, and it looked like a great idea. Here was a tunnel following a little vein of gold ore, and one spot looked real good, so we decided to sink a winze (which is an underground shaft) at this particular spot going down on the ore and figuring it might block out some ore that would be worthwhile. Unfortunately, we got down around twenty-eight feet. I recall, finally, this little vein of gold ore pinched down to nothing, so that was that. We spent just exactly one month there living in a tent.

Having your grubstake. Do you remember who you did that for, or was it just something you did among yourselves?

Well, Norman Annett and his brother Seryl and I were the key people involved. And Norman Annett is the one that concocted the idea. He found this tunnel, and he found this little bit of ore there, or heard about it. Anyway, that's where we went. And I guess we were working on a property that was leased from a prospector. By the way, his name was Guy Bishop, a real character in the Winnemucca area at the time.

And leasing, now was that something that was happening a lot during this time?

Oh, yes. If the prospector had a particular piece of property he thought was worthwhile, someone else would come along and lease it, with the idea that the prospector would get something out of it later on, and the operator would also get something out of it.

There were other interesting things happened at that particular time. I met a woman who was known as one of the early women miners. Her name was Josie Pearl. I'd heard various stories about her, so I was never quite sure whether to be scared of her or what. Anyway, she was reported to have been a madam in one of the houses of prostitution in Bodie years ago. I wouldn't be a bit surprised if those were all stories and no bit of truth in them whatsoever.

But regardless of that, this is what I was told, and I, being a gullible youngster at that particular time, why, I took it all in.

I remember so distinctly, she showed me a porous, soft rock, which had gold sprinkled all over the outside, loose. And I thought, “This lady is pulling my leg. These are brass filings.”

So anyway, I looked at it with a jaundiced eye, I guess, and she said, “Well, why don’t you break it open?” And I broke it open, and it was the same thing all the way through—gold. Little spots of gold here and there through the loose rock. I was really impressed by that sample. I’d like very much to have some kind of an idea where she got it.

She didn’t share that information, huh? [laughter]

No, no. [laughter]

So did you work with her, or did you just meet her?

No, I just met her. She had the adjoining ground. She later on was cook at the Leonard Creek Ranch, which is owned by the Montero family.

Was she someone that you stayed in touch with after you met her?

No. Well, I had heard about her afterwards. There are a few books around written on characters in mining, and I found her mentioned in one of them.

Right. Nevada author, Sally Zanjani, has just written a book about women miners, and Josie is in that book.

Yes, I ordered it.

Did you? Yes, about women miners, so you probably know some of them.

Yes. That's why I ordered the book. I wanted to find out more about what information she had. Yes. I just got her information the other day, and I ordered two copies, in fact.

So then, what did you do after the grubstake work, where you worked just for your food for a month?

Yes, I don't know, there were little jobs here and there. The fact is, I recall being up in northern California working for absolutely nothing, or really not doing anything except existing there. Somebody else footed the bill for food, and things were really tough back then. It was also during this period for a while that I operated a little assay laboratory here in Reno for a few months.

Your own or for someone else?

For someone else.

Tell me about that.

Well, a fellow came into town from Idaho and opened up this assay laboratory. He had all kinds of other endeavors as well, and so he was out of town. Anyway, I usually operated the lab myself.

Where would the samples be coming from?

There were just prospectors bringing them in. There was no great quantity of work whatsoever. Somebody would bring in one or two samples; that's all there was to it. I remember so distinctly, though, that about this time there was a fellow named Rink who brought some samples in—taken off of Peavine. They always ran a little bit in gold. [laughter] Thirty years later on, I guess, I tried to figure out about where this came from; and the best I could tell, why, the areas that were prospected by him were probably subdivided, built on now.

Oh, really? At the base of Peavine?

Yes. Or at least, if they're not built on, they're so close to housing you might as well forget about them.

In terms of mining. But was it a good assay?

They were good for nowadays, yes. They would have been worthwhile. Oh, yes, if you had those samples now, you'd do a lot of work down there.

Well, we should tell city council. Maybe they'll stop building out there. [laughter] What do you think?

They won't pay any attention to it. [laughter] No, it's an odd thing, you know, but take the Peavine area, particularly the Wedekind area around in here, it has the handprints or footprints of being a very interesting mineralized area. And if you were to run into this sort of a situation that you have here, elsewhere, where there was no habitation, you'd really be spending a lot of money looking for ore here.

Isn't that interesting. I didn't know that. I doubt many people living around here know that, other than experts like you.

Well, students have done a lot of work around here; and it's been mentioned several times that, boy, this is sure an interesting area, but you might as well forget it now.

Yes, because you couldn't mine where the housing is already being built.

Oh, you couldn't do anything. Yes. I couldn't blame the people in head of the housing, either. [laughter]

Yes, competing interests, I guess.

Yes, the old story, "Not in my backyard." [laughter]

So from the assay lab, how did you get back to school? It took you a while, as I understand.

Yes. In the fall of 1933—actually, September 3, 1933—I was working on a truck, and I had an accident. A piece of cast iron clipped my left eye, and from then on I had no sight in that eye. But, by a very kindly doctor here in Reno, I was taken to an eye hospital in San Francisco, and they worked on it for quite a while. The final end was that, a few years later, they had to actually remove the eye, because glaucoma was so bad, there was danger of it bursting.

Was this an operation that they did?

Oh, yes. Removed the eyeball.

But you have both eyes now. What happened?

Plastic. [laughter] I only have sight in one eye, but they do a pretty fair job, you see.

Yes, yes. I see the difference.

Yes, well, you can see the movement. This happened right after I enrolled in the fall of 1933. And, of course, I had dropped out then. That was the beginning of a long period of being out of school.

OK. And was it all related to getting your eye taken care of?

Well, it took almost six months for me to be in a position where I could really go out and work. And one of my first jobs after that was in February of 1934. There were about three or four of us hired by a geologist named Albert Burch to sample the Longstreet Mine east of Tonopah. I think there were five of us.

And you were out to do sampling on the mine?

Yes, it was sampling. Very, very difficult sampling and channel sampling. I learned something about sampling from that old codger.

Why don't you tell me about that? That would be of interest.

Well, keep in mind that we're now in the fall or winter of 1933. Albert Burch and Pat Willard are staying in Tonopah. In other words, every night he takes his samples in there. And the rest of us, three or four of us, were staying at what is called Five Mile, about fifty miles east of Tonopah. The spot is still there. And we're staying with some people. The lady—I can't think of her name right now—is a veteran rodeo rider.

Oh, so you're staying on their ranch? Is it a ranch?

Well, they lived there. I don't know why they were there. I don't think they owned the ranch. It's quite a large spread, really. That's one of the buildings that was on quite a little ranch holding down there. But anyway, they supplied us with food and bed, you might say, there. And this was in February. It was the first time that I had experienced real cold weather, and I remember it was thirteen below there. That was pretty cold for me. [laughter]

Because you were originally a southern California boy.

Yes, that's right.

So thirteen below. Did you have really good long johns?

I guess so. I don't really remember. [laughter]

You remember being cold. But tell me about the channel sampling. What is that?

By channel sampling, we refer to taking what we call a moil, which is a type of chisel, which has a point. Instead of a chisel end, it has a pointed end. And using a three- or three-and-a-half-pound hammer, you actually cut a channel in the rock—a channel about

four inches wide and maybe half-inch to an inch deep, well, half-inch to three-quarters of an inch deep. And you drop that on a canvas on the floor of the drift; then you take that material and, by hand with your hammer and an anvil, you break all the pieces up to where they're about maybe three-eighths of an inch in size. And then you roll the samples. By rolling them, I mean the canvas is laid out on the floor in the drift, and you roll from corner to corner to mix them up very carefully, and then you split that into quarters. And you take one quarter of that as your sample. It's a very precise way of sampling, and it's about as accurate as you can do it. I learned that from Albert Burch. Of course, a lot of people understand that sampling method, but anyway, at that particular time I learned it from him.

So, was it a new method, or you just hadn't been around it?

No, nothing new. It's just that I had no reason to do it.

Anything else that you learned on that job that was different?

Well, no, except that Albert Burch knew when to pull the plug on that sampling. In other words, he shipped his samples in everyday. He took them into Tonopah and then put them, I guess, on the train or the bus or something to an assay office somewhere, and then would get the returns back. And after his first few returns, why, he figured it was deep enough that he stopped it—stopped the work. By deep enough, I mean we've gone far enough on this. [laughter]

There are even books with that title, because that's a common mining term.

That's right, yes.

Enough risk on this one, huh?

Yes. Yes, that's right. That was one of the jobs that put a little money in my pocket. There were a few others at that time. And,

oh, keep in mind, we were in the middle of the Depression here, and things are really rough. We had the PWA, Public Works Administration, and so forth operating. I had quite a little experience in surveying. I don't know just where I gained it. Oh, wait a minute, I guess I gained it right there. That's right. Gerry Hartley, who I was working with on these jobs, had his dad's transit. And the PWA was putting together crews in this area—the Reno area of Nevada—to do some precise triangulation surveys of this region. Because I had the transit, or had Gerry's transit, why, we were able to go to work on this, and that was part of our work. Part of our work was also leveling, for which we used instruments furnished by the PWA. And we did quite a bit of work for several months around this area.

Just around the Reno area or in northern Nevada?

Actually, this work was done, I think, pretty much over the state, but our particular crews were working in western Nevada.

When you say “precise triangulation surveys,” what was the goal of getting this information? Do you know, or was it just something that hadn't been done?

Accurate surveying of the area in which you set up monuments, and you know very precisely where they are. It's a type of surveying that is now no longer used, because we have instrumentation that's much more accurate.

Anyway, we did that. And then the Leviathan Sulphur Mine was opening up, and we had an opportunity to go to work there. Three of us that were working on these survey crews, all involved in mining, went to work at the Leviathan Sulfur Mine.

Where was that located?

The Leviathan Sulfur Mine is twenty-six miles by road south of Gardnerville. And the Leviathan Sulfur did work more recently by Anaconda, who needed sulfur for the making of sulfuric acid, which they used at Yerington.

What was your job at the Leviathan Sulfur Mine?

Well, I was just a mucker, I guess. I was part of the crew that was driving a drift, but I also did a little surveying for them, as well.

Was this a job that lasted for a while during the Depression?

I'm trying to think. I don't think that lasted for more than three or four months, and then they decided that it was not economical to make the sulfur there.

So during this period of time, you were out of school, about five years?

I was out five and a half years altogether.

It sounds like most of your jobs were like three and four months. Is that about right?

Yes, yes. They were very short. Usually they were. However, I'm trying to think how I got started on this job. Well, also, along that particular period of time, I was on a survey crew for the U.S. Geological Survey, which was trying to lay out potential dam sites in this part of Nevada. We started out on the Little Humboldt River north of Winnemucca, and then we worked on the Carson, on two branches of the Carson River. Wait a minute. Let's just say we worked on the Carson River out of Gardnerville.

Then, somewhere about 1935, I went to work for the Nevada Highway Department, wherein we made rough surveys of all the secondary roads in the state of Nevada. That was a very interesting job, because it gave me an opportunity to see a lot of the state I'd never seen before and learn a lot about Nevada.

What was happening in mining activity around the state? You must have gotten a good sense of that while you were surveying roads.

Mining was not doing very well. A few mines were operating, but by and large . . . Well, Virginia City. There was a little activity in Virginia City at that particular time.

Do you know specifically which ones, or you just kind of know generally?

I don't know the names.

OK. But there was some work in Virginia City?

I remember there was a mill operating there, flotation mill.

And where was the ore coming from for that mill? Same area, Virginia City?

Yes, Virginia City area. I think it was all underground ore.

And then, around the state, were there small mines going? Any large operations at this time?

I believe Pioche was operating. Of course, Ely was operating. That was probably about the time that Rio Tinto started north of Elko, Mountain City.

Was that a large operation?

That was a medium-sized, underground copper mine. Very high grade.

And Pioche, what would have been happening there?

Pioche is the lead-zinc. It's principally zinc. Ely is copper, yes.

OK, and tell me about Austin, Eureka, Silver Peak—any activity in those areas?

I don't know of anything going on at Austin or Eureka or Silver Peak at that particular time.

Or Goldfield?

Little, if anything, going on in Goldfield. I believe there was a little activity in Tonopah, and there was some east of Tonopah. Can't think of the name of the operation. There were several small operations. There were at least a few small operations. There was an attempt to mine and mill some ore near Eastgate.

And where was that?

Eastgate is on U.S. 50 at the foot of the mountains before you get to Austin.

And you mentioned something outside of Fallon?

Oh, Wonder Mine is east of Fallon. Now that's about forty miles east of Fallon. Oh, north of Gabbs there was a little mining camp there. There was probably a little work going on there—very, very small work.

Would this have been an era when people were leasing?

Yes, a lot of it was leasing. A lot of it was.

So maybe one or two-man operations, just very small pockets?

Yes, that's it. Right, very small. Very small and shipping their ore to mills. That's about the time that I think the Westgate Mill was operating. The Westgate Mill was about, oh, thirty, forty miles east of Fallon. That was strictly a custom mill.

So it was tough times to survive in mining?

It was very, very difficult for everybody and everything.

Let's see, you were out working in 1932.

I went back to school in January of 1938.

Did you work on this highway department job up until then?

Yes. The highway department job is what kept me going for, I don't know, about a year or a little more than a year. I started with them in 1935 and worked for them pretty much all of 1936. Yes, that's correct. And then, in May of 1937, I was married. I had some vacation time coming from the highway department in 1937, and I was able to get a job doing some claim surveying out of Winnemucca on a small mercury prospect. Gerry Hartley and I went out there and surveyed these claims, and I ended up with \$265. And being as how my wife was working, why, the \$265 allowed me to go back to school in January of 1938. She supported me and helped me with my notes, helped type my notes.

What was her job?

She was working in a jewelry store.

OK. Tell me her name.

Juana. Yes, Juana worked for L.C. Griffin Jeweler in Reno for quite a while, and that kept us going.

So that helped you go back to school?

Yes, that very definitely helped me go back to school.

And you graduated which year?

I graduated in December of 1938. See, I was in school from January of 1938 to December of 1938. At that particular time the semester ended just about at the end of the year. And because I had done so poorly in my grades and so forth previously, I had to complete forty-four hours in that one year. That's twenty-two hours

a semester, which is a very heavy load. However, because of past experience and the help of my wife, I was able to do it without any problem, at all. The fact is, I was on the honor roll.

Great. So that was one of the best years for you, then, was your last year?

Yes, that was a very good year for me. I did well in school, and everything was going beautifully.

Was the schoolwork by your senior year more related to the work you wanted to do?

Yes. My schoolwork in my senior year tied in pretty well with what I had seen on the outside, and it really helped me quite a lot.

OK, anything specific? Can you give us an example of that? You were out of the mining methods class now, into some more advanced things.

Yes. I learned quite a bit about metallurgy, particularly cyanidation, in school, which tied in directly with what I had done previously and what I would be doing later on.

Was cyanidation a new process? That's a milling process, correct?

Yes, cyanidation is one method of extracting gold and silver out of the ore by dissolving the gold and silver. I first was exposed to this on a job that I did not mention to you, and I forgot about it, but at the Silverado Mine south of Wellington, Nevada, in about 1935.

That was your first cyanidation experience?

Yes, my first work with cyanidation.

But it was not a new process?

No. The cyanidation is a very old process. I don't know how far it goes back—somewhere around the turn of the century. But I know that there are books written on cyanidation that tied in to about 1910.

So you actually had experience on the job before you studied it in school?

Yes, I did, very definitely. I learned cyanidation right in a mill. I learned *something* about cyanidation, at least. And then I picked up a lot more of it in school. I got the background of it. [laughter] Interesting thing about cyanide and how dangerous it is and so forth, and the average fellow working in a mill at that particular time would have had the same experiences I had. In order to test solutions—to determine the amount of cyanide and alkaline in the solutions—we would use a pipette to draw a known quantity of the solution and put it in a beaker to test it. In drawing the solution, sometimes you would be taking it out of a beaker that was kind of a little bit low. And if you were so careless as to pull some air at the same time that you pulled the solution, you would get a mouthful of cyanide. The average person, I guess, after hearing the dangers of cyanide, would be shocked by this thing, but I found at that particular time that it is absolutely impossible for somebody to drink cyanide solution, because they just can't do it. As soon as that hits your mouth, you spit and spit and spit. It's awful! [laughter]

Your body just automatically rejects it?

Absolutely. Your body rejects it, because, apparently, as soon as it hits your mucous, which has a certain amount of acid in it, it must cause the hydro cyanic acid gas to form immediately, and that you cannot stand. Of course, it's deadly, but you don't have to worry about swallowing it. [laughter]

A lot of people would say, "Oh, swallowing cyanide; what a shock, yes."

[laughter] Well, anyway, that was one of the things I learned on the first place I worked with cyanide.



We're going to go back and pick up a couple of items that we missed. You wanted to share some information on the Depression era and sulfur mining?

Yes. I recall that there were four of us—all mining engineering students or graduates—who were working for the PWA doing surveying, which was one of the jobs that the government put out in order to allow people to sustain themselves. We heard that the Leviathan Sulfur Mine, which is about twenty-six miles south of Gardnerville by road, was opening up, so we went down there, and we got jobs with them. And during that time, why, the principal operation that we were working on was driving a drift by conventional air drill, air-operated drills. At the same time, why, the mill was producing a small amount of sulfur from the ore that they had there.

Did you live there while you were working there?

Yes, the camp was so far away from everything. After all, it was thirteen miles off of what we now call Highway 395, and the next twenty-six miles south of Gardnerville. So it was pretty well out in the boondocks, and we all lived right there. We worked the usual around-the-clock shifts, whereby, every two weeks or so we'd have a certain amount of time off. And during that time, why, we usually came back into Reno. I don't know what else to say about it.

How long did you work there?

Oh, I suppose I worked there about four months, something like that, on shift work. And after that, why, I went on to other small jobs here and there. I don't really recall just which one followed Leviathan Sulfur. Leviathan Mine, by the way, was later used as a source of sulfur by Anaconda Company when they were operating at Yerington. They required the sulfur for sulfuric acid for their acid leaching of the copper ore.

So you were mining a product to be used for mining.

That's correct.



Did you want to go back and talk about a couple of the professors at Mackay School of Mines.

Yes. In regard to the School of Mines and the profs and the engineering department, why, there were a couple who really made a terrific impression on me, particularly, Irving Sandorf, who was the electrical engineering professor and taught a course in electricity for engineers. Actually, not electrical engineers, but for other engineers, and this was a required course for mining engineers. I found it to be an excellent course, but particularly because Irving Sandorf was very meticulous in making up his preparatory notes for the lectures and doing an excellent job in teaching in general. I found later that I was not the only one who thought that Irving Sandorf was an excellent professor.

Were the things that he taught particularly helpful to you when you got out into the field working?

Not particularly, because it just so happened in my field of work I did not run into these particular problems. But I think it was very valuable. I learned a little bit about electrical engineering in general.

The other prof that I thought was very good was Walter Palmer in the Mackay School of Mines. Palmer was the director of the analytical laboratory. And because of the many samples of Nevada rocks coming to him, he gained a terrific knowledge in Nevada minerals. Undoubtedly, Walter Palmer was probably the best mineralogist that we've ever had in this state. One would ordinarily think that Vince Gianella would fit this particular position, but Vince would have been the first one to say that, no, Walter Palmer was far ahead of him in the understanding of the mineralogy of the minerals found in the state of Nevada.

Walter Palmer thought that it was extremely important for the students in the Mackay School of Mines to have a good knowledge

of mineralogy, because when they would get into metallurgical problems, it was much easier for the operator to understand metallurgical problems if he had a good understanding of the minerals that he was dealing with. And Walter, in his squeaky voice, would continually hammer on the idea of metallurgy students learning more about mineralogy.

Other than that, I would say I thought all of the profs that I had in engineering, both the Mackay School of Mines and other engineering, were very good. No complaints.

From your perspective, since you were in school and then had to take some breaks working in the field, did you feel that state-of-the-art technology was being taught in school? And were you seeing it on a day-to-day basis out in the field?

What you were taught in school was a good background, you might say, but to me it was worthless without the experience you picked up in the field. As an example, I took a course in technical writing from Dean Sibley, a conscientious man, by the way, very low profile. But anyway, he did his best to teach me a little bit about technical writing. But I found later that it was practically worthless, as compared with what I learned by actually sitting down and doing the job. Conferring with other engineers and geologists about my technical writing, various people in the U.S. Geological Survey, in editing some of the material that I wrote, gave me far more information than I'd ever, ever got in school.

So it was really the experience, combined with the philosophy from school, that completed your education.

Yes. That's right. Well, what I learned was of some use, but it needed an awful lot of polishing from the outside. I think so far as the metallurgy—which, when I got out of school, was the first thing I tackled—I benefited very definitely by what I learned in school. But, again, the practical experience was very valuable and absolutely necessary to give me a better knowledge of what I was doing and what I was trying to do on the outside.

Vic, you mentioned something about metallurgy students needing to know mineralogy. Would you explain that in more detail to me?

Any mining engineer or geologist is required to take quite a lot of mineralogy. It's absolutely necessary for him. But metallurgy, that was Walter Palmer's field. He insisted that the student have a good understanding of mineralogy, because, in order to properly separate the various minerals in a rock, it was necessary for him to understand the peculiarities of these minerals. Walter emphasized this tremendously, and he was absolutely right.

And was this something that wasn't normally emphasized?

I don't believe it was. I don't know of any other prof that emphasized this like Walter Palmer did. And he was dead right, right down the line, that it was necessary to have a good understanding. I remember so distinctly, he would give us these rocks. You'd think this was a class in mineralogy, but it was not. It was a metallurgy class, and he would give us these rocks and ask us to identify the various minerals in them. I suppose some of us thought that this was rather peculiar in a metallurgy class, but Walter was so right.

Why is it important to understand mineralogy?

It was important to understand the mineralogy, so that you could figure out how to separate these various minerals.

It was pretty basic then?

Yes, it's very basic, but so very often some of the most obvious things are overlooked.

Silver Peak, Nevada, was your first job after you graduated from college in December 1938, and then from Silver Peak, you talked about another job in northern California. Could you describe that job to me, please?

At Silver Peak, I worked with Gerry Hartley, whose dad had a small gold mine in northern California. And it looked like there was a good possibility there of making it a good producer. It was a narrow vein of adequate gold content, and it had been worked there previously, and there was a small mill on the property. We added sand-leach cyanidation to this mill, with the idea that the ordinary amalgamation as used in the mill usually only recovers about 50 percent of the values. We thought it would behoove us to get more of the values out of the ore by using sand-leaching. Well, the amalgamation in the mill worked fine, but the sand leaching didn't work so well, principally, because I could not seem to get the zinc box precipitation to work properly.

Now tell me what that is, the zinc box?

Zinc box is a method whereby the solution, which contains gold and silver, passes through shredded zinc, and the gold and silver precipitate on the zinc, and the solution comes out at the end of the box more or less barren. The only problem is that, if things don't work just exactly right, why, the cyanide solution chews up the zinc, and you end up with nothing but a mess. And that's what I had. It's commonly referred to in the business as zinc shorts.

And did you ever find a solution for that at that mill?

Oh, no, not entirely. It was pathetic. When we melted the zinc precipitates, why, we got so little out of them that it just wasn't worthwhile. The operating of a zinc box precipitation, properly, is an art, and one of the artists in this would have been Bill Donovan, who operated down the canyon in his custom mill just below Silver City for many years. He was a real expert at this.

So he was one of the artists who could make it work.

Yes, it would work.

But when you tried it, you weren't able to?

It didn't work for me because I was an amateur. [laughter]

I see. At that point, you had your degree, but you were still considered an amateur?

I certainly was. [laughter]

TEACHING PROSPECTING

WHAT HAPPENED after your northern California experience? What was your next job?

That's when I very happily got a telegram from my wife saying that the Department of Education would like to talk to me about teaching an itinerant prospecting class. If I remember right, the offer was \$250 per month. That was great at that time.

It was a steady job?

Well, it was a steady job for about nine months out of the year. Remember, these prospecting classes operated during the school year, because they operated in public schools.

In high schools and that sort of thing?

Usually in high schools, yes.

Where were these classes taught?

Well, first of all, these classes would ordinarily last three or four weeks—three weeks if I only taught mineralogy and geology and so forth, but four weeks if I also included a course in fire assaying. However, in some places the school preferred to have the class there for four weeks, whether I taught the fire assaying or not.

All of the classes were taught in Fallon, Virginia City, Winnemucca, Elko, Beowawe, Rio Tinto, Getchell, and Eureka. That's about all that I can recall now. I think that's all.

So all across northern Nevada?

Yes, absolutely. We were sticking just to northern Nevada.

And so you would go out for a month to these locations, or was this a one-night class?

No, I would travel. In other words, I would go to a place for, say, three weeks, and then I'd pack up and go to the next spot. Travel was only from school to school. They were all evening classes, every night of the week, six days a week, if I remember right. I'm not sure now. It was strictly night classes, and usually I would try to set up a field trip on weekends or on Sunday.

What kind of attendance did you have at the classes?

Oh, the attendance was anywhere from about ten to twenty-five, something like that.

So you had a pretty good turnout?

Yes, it's fair, but it's very difficult to keep a class like that going. You try your best to make it interesting, but, for one reason or another, there's a lot of interest at first, and then it slows down. In other words, you're asking students really to use their head and study a little bit, you know, and a lot of these people are not inclined that way. They'd rather you tell them stories. [laughter]

Tell them your stories and tell them where to find the gold?

Yes! [laughter] Never mind having to learn something about geology.

I see, so it was a little bit of a struggle for the teacher.

Yes. I might add that Wadsworth was also included.

OK, so nine months out of the year, this is what you did. You would go from spot to spot and teach class.

Yes. In the summer I would find something else to do.

What did you think of teaching?

Oh, I enjoyed it. I had no problem with teaching, whatsoever. By the way, we also had classes at the University of Nevada, Mackay School of Mines. I forgot about that. Again, they were strictly evening classes for adults. They were set up for adults, and I don't think it was legal for students to attend these classes, because the idea was that the Department of Education set up other facilities for them.

So students under the age of eighteen, or high school students, wouldn't be allowed into the classes?

Oh, no, there was nothing . . . That never became a problem, but that was the way it was set up. It was strictly for adults.

And did people get credits for this?

No.

It was just continuing education type of thing?

That's all it is, yes.

Adult education?

Yes, and continual education, but also the idea of a fun avocation. That was the general idea.

Were most of your students already interested in mining, or was your job to kind of get them excited about the mining?

Most of the students were already interested in prospecting.

They already had some experience, did they?

Yes. They already knew something about it. One of the places I have mentioned that I had classes was at Rio Tinto Mine, and that was interesting because the best specimens of crystalline native copper came out of the Rio Tinto Mine, and I had an opportunity to see some of these and get some of these. But, unfortunately, I did not make a collection of them, and I don't know whether a collection exists. I suppose it does. But, by and large, the best crystalline copper that I have ever seen came out of the Rio Tinto Mine. A lot of it is probably there in some of the waste dumps.

So that was exciting to you to see that?

Yes, it was, very.

And you must have gotten a sense then of the kinds of work going on, because this would have been late Depression years, correct?

Yes, 1938.

Right before the war started.

Yes, 1939, 1940, 1941, and it culminated with the bombing of Pearl Harbor, December 7, 1941, when I had taken a field trip out in the Schurz area from my Fallon class. We came in, and at the first house we stopped, this fellow and his wife came out and told us Pearl Harbor had been bombed . . . [becomes emotional] Sorry.

That's all right. Do you want me to stop the tape? [tape paused]



I mentioned I also had a class at Beowawe, and there I was fortunate to visit a little silver mine owned by the Fallini family, and there had the opportunity to see native silver—a very interesting mine. They had operated it on and off, but it was very difficult to make a profit at.

For someone who doesn't know, what is native silver? Why is that unique?

It's like native copper; only it's silver instead of copper. It's crystalline native silver. And some of it doesn't actually look crystalline. It is crystalline in the ore. You find little strings of it in the rock. It's very pretty.

I might mention that I made many friends, prospectors, and one of them particularly was Cy Cox in Fallon, who is long since dead. But he was in these classes, and he was a real character. He operated a small garage in Fallon. I say "operated." That's a slight misnomer, because he had a garage, but I think he spent most of his time prospecting. He didn't do much work, actually, in the garage.

A good example of gold fever, is that what that was? [laughter]

Yes, well, I guess so. I had seen him with real gold fever. I saw him panning something at a little prospect one time that he had, and all of a sudden he ran into a real hot spot, and he really went wild. [laughter] But Cy Cox was an interesting person. He probably knew more about lost mine stories than anyone that I had ever run into. And his belief was that, by trying to follow up lost mine stories—to try to actually find the mine, the general locality—in that way he found other prospects that were worthwhile.

So you must have met a number of people who had their own little family mine, or they went prospecting on their own all around Nevada?

Very definitely, yes, that's right. And usually, it was these people who knew of a little prospect that they would like to have me go out and look at it, and I'd make a field trip out of it. So this happened out of Fallon quite a bit.

I believe it was Cy Cox, in this particular case, that had a prospect that we went out to visit. It was a patented claim that had free gold showing, and the locality was a few miles east of Brady Hot Springs, now commonly referred to as just Hot Springs. And we went out there, and sure enough, you could find little specks of gold here and there. And other mining had been going on in the district. It was a worthwhile area.

So there were several of these around Fallon when you went and taught there?

Yes, that's right. Of course, this particular property is quite a ways from Fallon, when you come right down to it.

I remember that particular trip, why, Peggy Hatton-later Peggy or Margaret Wheat-was in the class, and she brought the lunch for our sort of a picnic. And part of the lunch was pickled pigs' feet, and Cy Cox always used to refer to Peggy as "Pigs' Feet Gal." [laughter]

Was that a popular picnic item?

Well, I never ran into it before or after, but it was great. [laughter]

So that was Margaret Wheat—Peggy Wheat—who did a lot of work in this area with the Native American Indians?

With the Indians. Yes. Another interesting sidelight is, about that same time, why, the Nevada Department of Health would send itinerant dentists around to various schools in the boondocks. My dentist at that time was Sieffert in Reno, and, lo and behold, I met him at the Getchell Mine. He was there to take care of the teeth of some of the young children, where it was difficult for them to get out to a dentist. It was pretty isolated at that time.

So the families were living at the mine?

Oh, yes. Yes. Well, it was through the school system, too.

I wanted to just pursue this topic a little bit more, because you've talked about various people doing some prospecting on their own or a family mine. Was that very commonplace for people to do at that time, to supplement their income? I mean, can you give us some other examples of that?

Yes. Oddly enough, some of these prospectors did supplement their income by doing this. I remember one in the Fallon area, a fellow by the name of Fred Erb. He had a small operation, if you want to call it that, about sixty miles, seventy miles east of Fallon, and he found that there were some high-grade stringers in this very talcy ore. I should say soft, talcy ore. And he set up a sort of a homemade mill and was able to make a little money out of it. Years later I examined that property, and I could see where he had worked his stringers. Other companies had attempted to make a mine out of this by working it on a larger scale, but I don't think they were ever able to do it.

Was it the type of situation where only a small-scale operation could be successful?

I believe so. That's the way I looked at it. I felt that a couple of fellows working together could dig out these stringers and amalgamate that in a small mill. But to try to move very much of that rock was practically impossible. It was hardly rock. It was a very, very soft material. You couldn't make a profit out of it.

Too labor intensive in terms of overhead? Is that where it would lose its profitability?

Well, there just wasn't enough mineral in the rock. That's the problem.

To support more than a couple of people.

Yes. If a couple of men worked these high-grade stringers and would pan it once in a while to see how everything was going, that's fine. But to try to make a mine out of it, that just didn't work out. Yes, actually, the locale of this is about seventy or eighty miles east of Fallon.

Do you recall running across other examples like that when you were out teaching? You said some of these small, little mines provided the field trips for your classes.

Yes. Well, the one that we visited on December 7, 1941, was a silver-lead-zinc property near the east side of Walker Lake. And it was interesting there to show the students that you could find spotty high-grade silver or higher grade silver ore near the surface, because of the surface concentration of this ore. But other than that, why, not much there.

It was all on the surface? There wasn't anything to go underground for?

Yes, on the surface. Underground, it was truly not enough mineral. That's the only one that I can think of right now.

What happened to these classes after Pearl Harbor?

Oh. Well, of course, after Pearl Harbor—for those who were old enough remember—why, lights were out because of the threat of bombing, and you had to leave your lights off and/or seal your windows so that the light could not shine through. And if you recall, why, I believe the automobile lights were more or less stopped because of the danger of bombing. Keep in mind that this was in Fallon. We weren't very far from the ammunition depot at Hawthorne. And that was one of the reasons that we were more or less vulnerable.

I tried to keep the class going for just a few days after Pearl Harbor. Then, about that time, why, the War Department was looking for people to examine the various mining properties on bombing

and gunnery ranges in Western states, and I was more or less drafted to go into this type of work. So that was the end of the classes.

Tell me the details of how you got “more or less drafted” into this.

Well, I had been previously talking to someone involved in the War Department about this work, and I was not particularly interested, because I had a job and I was doing it. But after Pearl Harbor, the people they had in Reno War Department came along and said, “Well, we’d appreciate it if you’d come in and help us on this,” so we did.

Did the Department of Education end your classes when you left there—those itinerant prospecting classes?

Yes. They were stopped then. Actually, I don’t think they ever started again. Prospecting classes did occur after that, but they were not the same as what I had. Fact is, one of the reasons I came back to Reno after being gone for about twenty-one years was because I found out that the Mackay School of Mines was putting on a similar class in geology for prospectors, you might say, where they definitely said, “If you understand prospecting and mining, you’re in the wrong class. This is strictly for amateurs.” [laughter]

WAR DEPARTMENT
AND BUREAU OF MINES

***L**ET'S SEE, we wanted to talk in a little bit more detail about the kind of work you were doing for the War Department and where you went to do this work.*

Well, the work at the War Department started You recall, December 7th would have been the wintertime. It started the winter of 1941-1942 on the Tonopah bombing and gunnery range, wherein we examined as best we could the various mining properties that people had, improvements on them, and what we thought the potential might be of these, in order to determine in some way how the claim holder was being damaged by not being allowed to go onto his ground. And we covered quite a lot of ground in Nye and Clark counties.

So you were out checking on individual small mining claims?

Yes. There were no large ones involved. We also worked in California near Marysville. We were in quite a bit of Arizona and New Mexico.

When you assessed the mines, what kind of information did you give to the War Department on those mines?

Well, we sampled the mines, and we gave them the sampled results. We gave them information as to the improvements that had been made on the mines, and the amount of money that the claim holder had spent on this property, and other information they wanted. Later, a different group in the War Department went out and settled in some way or another with these people.

So you wrote the report, but you never knew the end result for the individual miners?

No. Could have gotten it if we'd have been interested. Too much red tape to try to get that information.

Did they actually buy the mine from the person, or did they just pay them? Were they ever allowed to go back and work those mines?

No, they were not. I don't know that they were ever allowed to go back, simply because those bombing and gunnery ranges still exist.

So again, you were doing quite a bit of traveling.

Yes.

Camping out or staying in Tonopah?

My wife stayed here. She worked at the Herlong ammunition depot, and I was in New Mexico while she was doing that. However, some of the traveling we did together. She did not travel with me on the jobs in Nye and Clark County, and I would come back once in a while. Fact is, I came back quite frequently. And then in California, why, we had a trailer, and the people in Grass Valley at one of the parks there were very kind, and they allowed us to park in the park while we were doing sampling on what was commonly

referred to as the Marysville Cantonment Area. It was set up for practicing tank warfare, a rough area to give men experience necessary to operate tanks in rough area.

So, is this the job that you held all during the war years then, or was it a short-term project to assess those mines?

That work was finished about 1944, if I remember correctly. After that I worked in a small mercury mine near St. Helena, California. Oddly enough, I was working for Conrad Martin, who had been one of the engineers, one of the appraisal engineers for the War Department, who I'd also gone to school with, and who I still keep in contact with. He's a consultant here in Reno now.

So you did this War Department work for about two, two and a half years and then went to the mercury mine?

Yes, and the small mercury mine out of St. Helena. About that time, my brother's wife died. My brother was in the insurance business in Los Angeles, and I went down to Los Angeles to be with him a while, because it was a traumatic experience for him. I got a job in the shipyards for about three or four months, something like that. And then, I got itchy feet for mining again in Nevada, and I found that I could go to work for the U.S. Bureau of Mines drilling iron ore in the state, which I did. I did quite a little drilling east of Lovelock, and then I also explored a fluorspar deposit about fifteen, twenty miles northeast of Lovelock, and then I drilled an iron deposit out of Gabbs.

Tell me a little bit about what was happening in the mining industry during these war years, because we know that there was major change caused by the war.

Yes. The mining industry was pretty dead about this time. However, it was active in tungsten. Tungsten being a strategic material, why, there was a lot of activity at trying to mine tungsten wherever they could. One would expect mercury to be good about this time,

but I don't think it changed a great deal. There was probably a little bit more mercury mining going on, but not a lot.

Were there tungsten mines in Nevada at that time?

Yes, Nevada is a very important tungsten source. And the Nevada Massachusetts was operating at full swing, as far as I recall, and there were a lot of small tungsten mines around. Nevada Massachusetts Mine is near Imlay. It's north of Imlay, Nevada. And, by the way, for many, many years that mine was the principal producer of tungsten in the United States. There were a lot of small tungsten producers. There was a small tungsten producer east of Fallon, and there was a mill in Fallon that was concentrating ore.

And then you talked about fluorspar. Was that after?

No, it was before. That fluorspar drilling I did for the fluorspar exploration was at the same time, more or less, tied in with the iron. I finished the drilling of the iron at Lovelock, went to the fluorspar, and then, I think after that I went to Gabbs where they drilled iron there.

OK, and this was all for the U.S. Bureau of Mines. What was this exploration for? What was the purpose of it?

Well, it was found that there was some iron ore in Nevada, and there was a need for a domestic iron ore source. I guess that was the principal objective.

The need was caused by the war, or was it caused by the demand after the war?

I think it was caused by the war itself. Nevada iron ore deposits are largely magnetite, that is, they're high-grade magnetite running about 60 percent iron. The type of ore we have in much of Nevada is what is known as a hard lump ore, and that ore was necessary in the open-hearth furnace method of making steel. So that's why Nevada was important for iron ore.

It was used in making steel, and that was very important during the war years.

Oh, yes. See, in the process of iron ore, the iron ore goes through the blast furnace and comes out as pig iron with a high carbon content. Then that is refined in the open-hearth furnace by dumping this hard lump ore in the melt.

So Nevada, because of the type of ore that was here, played a key role in that during this time?

Yes.

And that was part of what you were doing, finding new sources of this iron ore?

Yes, find new sources, find out something about the quantity of iron ore in these deposits that had been found. Some of these deposits were known for a long, long time.

So it wasn't all new exploration?

Oh, no. It was not new exploration, at all. It was a matter of extending iron ore reserves on known ore deposits.

And so this took you all around the state, and this was towards the end of the war that you were doing this—right before the war ended?

Yes.

And the main thing that you saw then was tungsten mining and iron ore mining?

Yes.

Anything else going on in Nevada at that time? Was that because the war placed limits on precious metals?

Well, the Baxter fluorspar deposit east of Fallon was operating all during this time—a very important operation.

What is the fluorspar important for?

Flux. Good flux for any melting.

Can you describe what that is for someone who wouldn't know?

Well, it simplifies the melting and removal of impurities and so forth.

So that was greatly needed during the wartime with all the metals.



We were just talking about the skills of underground mining.

Well, you were mentioning that Russ Fields told you that these underground skills are being lost. My comment is, that's an error. They're not *being* lost. They were lost a long time ago. I recall when I was at the Rio Tinto Mine giving one of these prospecting classes. That was about 1944, I believe. I was talking to people at the mine there, and their problem was that they had to teach men underground mining—how to handle themselves underground, how to use the equipment, and so forth. So it was about that time, and even before that, underground miners were just gone. That's all. They died off, and no new ones being trained except at places like the Rio Tinto Mine, where they had to. That was not the big beginning of open-pit mining, but for one reason or other, why, underground mining became less important.

The process itself became less important. People weren't mining underground as much?

A lot of the mines, the underground mines, were probably shut down for economic reasons.

For the war?

That's one reason. And then, gradually, after that, why, we were able to get along with lower-grade material, which could not be handled underground, but was handled by open-pit methods.

That brought an entirely different breed of people into the picture. That brought in people that had to be trained to use extremely expensive equipment—these trucks. We're talking about stuff that cost maybe up to a half a million dollars, you know, that one man is handling. And he has to be well-trained, because it could be a terrific loss.

But that's much different than the skills—like the drilling and the blasting and the mucking and so on—used underground.

Absolutely, yes. I don't really know just when we lost people there, but it was about that time and before, that we lost that know-how.

Because you were seeing the loss in 1944 when you were doing the classes?

Yes, and before that, yes. I remember in the 1930s, there was no problem in finding underground miners, because, of course, those were the Depression years. I remember in Bishop, we went down to what we called the “jungles” to look for underground miners, and there was really no problem in finding them. These people were experienced. During the Depression, men would be just knocking around and have very little, so they pooled their resources to camp in the woods and cook food. These were experienced, intelligent men, such as a hoist man I found there.

They had the skills. They knew what they were doing.

Yes, they had the skills. Right. They were the ten-day miners, as we called them at that time. That meant that they worked on a job for a short period of time, and when they got a few shekles in their pockets, why, they went off. And it was “deep enough.” [laughter] [In mining the term “deep enough” sometimes means “I've had it,” and is used when miners are ready to leave a job.]

Deep enough, they left. That's interesting, because some people are thinking that underground mining skill was lost later, when the big open-pit mining started in the 1960s. And you were seeing it twenty years before that.

Oh, yes, yes. It was lost way before that. I think it was economics. The underground mines just couldn't pay off, and they couldn't survive for one reason or another. I don't recall enough about the price of metals and so forth, but when I first went in underground in 1929, why, the price of copper was very good. And then, of course, remember that we had the crash, and the crash had probably as much to do with shutting down the underground mines as anything else.

The big operations went down then?

Yes, the prices of metals dropped, so they couldn't continue mining underground.

And yet, there was still a fair amount of mining activity, from what I understand, in the 1930s. That would have been small operators?

Well, there were a few small operators and those larger operations that could just make it economically, that's all. A lot of them couldn't, so they had to kind of slow down.

Because mining was one of the jobs available in the 1930s here in Nevada?

I guess it was.

I mean, you worked in mining, and you were able to find jobs.

Yes, yes. I was able to. I was just fortunate enough to be someplace where they were. As an example, I remember in the 1930s, working at a place where they were rehabilitating a hydraulic mine in northern California. Well, people were investing in that,

and the price of gold had gone up to thirty-five dollars, and that made the smaller operators . . . well, it made everybody in mining a little bit more able to survive. The small fellows probably were better off, because they could move quicker, so far as taking advantage of the prices of gold.

Move quicker? Can you explain that?

Well, they can get in there and get the ore out and ship it, or whatever's necessary, quicker than a large operation. Might take them three years, you know, to get themselves all set up.

So, working small quantities, you have a faster turnaround in terms of getting it out and getting it back.

Yes, that's right.



Now, would you say again what your degree is and what your experience is?

Well, yes. At the time I started at the Mackay School of Mines, the curriculum was more or less evenly divided between mining, metallurgy, and geology. We also had some electives, so you could branch out a little bit more in any one of these three avenues. My objective was to get an education as broad as I could in all three: mining, metallurgy and geology. Therefore, I graduated as a mining engineer. But with my original curriculum, why, everybody graduated as a mining engineer. There was no difference. Then, later, they started specializing more, and I was probably one of the last that graduated in that broad-based curriculum.

It so happened that my first job out of school was in metallurgy. A lot of my experience, previous to going back to school, was in metallurgy. However, it wasn't long before I got into geology and geologic exploration, principally through teaching the prospecting classes in northern Nevada. That had more to do, probably, with broadening my interest in geology and geologic exploration than anything else. And following that I just went

into other avenues of mining, and they were usually in the exploration field.

So that's been really the focus.

That's been the focus.

Your career kind of got set after you got out of the school.

Yes. My first job in mining was strictly mining, underground mining, prior to graduation, but after that it was more geology and exploration than anything else.

SMALL-MINE OPERATIONS

YOU SAID THAT most of your work was with small operations. Could you give me some details and examples?

Yes, I guess they were. Well, my first job out of school wasn't really a small operation. I was in metallurgy at the Cord Mill, which we've gone over before. The next one was where we tried to make a small mine in northern California pay, and that was a very, very small operation. We built a sand-leach tank and the necessary cyanide precipitation boxes. And then, after that, I went into teaching prospecting classes. And then, after that, it was a matter of the war coming along, and I was examining small prospects here and there. I guess somewhere along the line I worked for about a year near Bishop in a small gold operation. It was really not an operation. We were sinking a shaft. That experience, I guess you'd say, was strictly mining.

And that was mining rather than exploration?

Yes, that was mining, because we were sinking a shaft there, and I learned quite a bit about the handling of machinery necessary to keep a small operation like that going.

Can you go into some detail about exactly what machinery you mean and so on? Can you describe that?

Well, in a small mine in those days, you have no electric power line going in, and you had to have engines that would power your compressors and power your generators. Your generators were not so important, because you could get along with very little in the way of electricity for lights. However, I come to think of it, why, we also had one pump that was electrically operated. But most things around mines were operated by air. Therefore, the compressors were very, very important, and you had to have equipment to power those compressors. Your hoists were probably an old-time Fairbanks Morse one-lunger. By that I mean a single cylinder—very common in those particular days. By the way, the last time I saw one of these operating was at the Crowell fluorspar operation in Beatty in about 1950.

And so, they are not used anymore—the Fairbanks Morse?

No. That type of equipment is now a museum piece.

I see, OK. But that was what you worked with at that time?

That was one of them. The other was strictly a four-cylinder gas engine—very simple hoist—but very efficient.

You had talked about working with the Fairbanks Morse and the four-cylinder gas engine. Was this at the mine outside of Bishop?

Yes, that was it

And that was a gold mine?

Yes, that's right. In later years I was again in the Bishop area, and there were about three of us involved in the small group. We did some diamond drilling on a tungsten property and also mined

tungsten ore, as well as milled the ore in a small mill we were able to rent.

Tell me a little bit about the process, the diamond drilling.

There was a young man that I went to school with—a middle-aged man, actually. His name was Otis Kittle, and he was interested in investing small funds in mining, and so there were about three of us involved here. We were trying to find something worthwhile to work on, and all we found, really, that was worthwhile, was a little tungsten deposit out of Bishop. He put up the money to purchase a second-hand diamond drill, and we operated this in order to find more ore in that mine. It so happened that our diamond drilling was not successful. There was a little of the ore left. Continuing the mining, we were able to take out enough ore and mill it in a small mill nearby that we rented, and it helped pay for the operation. But in the end, why, it didn't make any money for anybody, and at the best, we more or less broke even.

Was this during World War II?

No, no. This was after World War II.

Was tungsten a metal that was pretty much in demand all through the past, or did it change in terms of world market demand?

Tungsten was in demand at a good price. It was important during the war years and even after the war years. Tungsten is an extremely important ingredient in tool steels. It has the property of holding its edge at red-hot heat. I shouldn't say red-hot. Red heat. In other words, a tool can be red due to the heat and still operate. Ordinary steel becomes very soft when it's red. Tungsten steel, not so. During the war, why, tungsten was used somewhat in armaments, but usually its importance is in tool steels. And, of course, remember after the war, why, a lot of

industries were retooling, and that made tool steel more important, too.

So tungsten was really in demand then?

Yes, it was. I don't know just when the price went down. Finally, imported tungsten was so cheap that the tungsten mines here in the United States pretty much shut down.

Right, but all during the time that you were working through the 1940s and 1950s, the price was high?

Yes, the tungsten price was good.

All right. So that was one of your small mine experiences. What were some of the others?

I don't think there were any others except just seeing what was operating and what was going on.

Can I go back to the diamond drill, because being a novice to all this, I don't know You said the diamond drilling was not successful, and yet you were able to get some of the tungsten out. Can you explain? Was the diamond drill something new?

Oh, no. The diamond drilling is a very, very old exploration process. We used the diamond drill to find a deep extension to the ore, but it just didn't work out. We didn't find anything. But there were some old stopes over there, and we continued on those stopes, and we were able to pick up a little extra ore just by following the ore, you might say. That's an old, old adage: when you have an ore showing, stay on it.

Was there a particular method that you were using at that time?

They were just strictly open stopes. Nothing. Very simple. Simple way out.

You were drilling, blasting the rock?

Yes, it's just very simple drilling and blasting.

Earlier we got onto several subjects, and one of them was the hearing loss that you said might have been caused by the diamond drill. Could you go into a little bit of a comment about safety procedures? What kind of safety procedures were used when you were first in school and out in the field?

Well, unfortunately, in those days in a small operation there were very little in the way of safety procedures used. I recall the diamond drilling. Obviously, we should have worn earplugs. Even with earplugs, why, the whine of the high-speed turbine engine on the drill was excruciating. Hard on the ears, and you're deaf for a while after using that piece of equipment.

By the way, I forgot to mention, while I was with Otis Kittle, why, we found a small lead-zinc property about twenty miles south of Gardnerville. We tried to find some additional ore there, and some of this involved using jackhammer drills. There again, we run into something that's very hard on your ears, and that might have had something to do with my loss of hearing, too. We did a lot of work there, but we didn't find any extensive ore. We found little bit of ore, but not really worthwhile.

That's about the end of the small operations that I can tell you about, except that it was very unfortunate that, with small operations like this, it was very common that the safety procedures were not what they should have been. However, a lot of it was just plain ordinary judgment that protected the people. I remember so distinctly, at this mine down in Bishop, being a young fellow—kid, you might say—why, I was down the shaft, and I noticed that by hand it was kind of interesting to see how I could swing the cable—reach up and swing the cable back and forth in the shaft. And this was of interest to me to see the cable whipping back and forth like that, I guess, as a foolish kid would do. Anyway, when I got back up to the top, I was told in no uncertain terms, "Don't fool around when you're underground. Don't do things like that which are absolutely unnecessary," because, ob-

viously, the hoist man at the surface had no idea why I was messing around with that cable. And not knowing what's going on, why, you could imagine that there's some problem. There was no problem, of course.

He might think it was an emergency?

Yes, that's correct. But there was none and, in other words, just plain ordinary horse sense tells you when you're underground, don't mess around. Everything has a purpose. Follow through the way things are supposed to be done. Don't try to do something that's absolutely unnecessary like that.

You got some quick lessons.

Yes, in a few minutes I learned a lot.

Fortunately, not by being hurt, though.

No, no one was hurt. I was just told, and I thought about it. I was wrong.

YOUR DEGREE is in mining engineering, and yet, most of your career has been in exploration. Could you talk a little bit more about that?

Well, my experience in exploration, of course, started when I started teaching prospecting classes, because I had to really brush up on my geology quite well in order to try to teach a little geology to the prospectors. And then, in work that followed, why, when examining prospects on these various gunnery and bombing ranges during World War II, it was necessary to understand a little bit about the geology of the ore deposits involved in order to give some idea of what you might think the potential of a property would be. And one thing always led to another.

Finally, when working with the Ford Motor Company in the Upper Peninsula of Michigan, it was very necessary for me to learn something about the geology of the iron deposits there, because I was looking for more iron deposits, if I could find them. Later, we decided to see if there were base metal deposits involved in the same area, and we did a lot of field geochemistry there, and here was a method that was taught to me by some

exploration geologists from some Canadian company. I followed through by learning more about this method and used it for several months with a crew of about six people in the Upper Peninsula looking for these copper-lead-zinc deposits, which we thought might be possible there.

Following my leaving Ford Motor Company there, why, nothing was done to follow up the work that we did. But I still think that there's a possibility for some other base metal deposits in that area. Of course, that area is well-known for copper deposits, but I still think that it had a possibility. Unfortunately, I was interested in geology and prospecting, but Ford Motor Company decided they were not interested in prospecting.

At the same time, before I left, I also found out something about manganese nodules or pellets being on the floor of the lakes, like Lake Michigan, and I did a little exploring there with necessary tools, scraping the bottom of the lakes to find out more about these pellets. Sure enough, they are there, and they develop under certain peculiar oxidizing conditions.

You were talking about your time with Ford Motor Company. My understanding is that it was an important time. Ford Motor Company was taking the leading edge in terms of the exploration they were doing and mineral resources they owned. Can you fill me in on that?

Ford Motor Company, in order to be assured of having good sources of various metals that they had to have—iron, lead, and everything else—you have to go back to the old, old Henry Ford. He wanted to be self-sufficient in everything, even to the extent of trying to have his own rubber plantations in South America. He had a lead mine in Idaho somewhere, because he wanted to be assured that he could get the lead for his batteries. Part of that same idea, that same philosophy, rubbed off on later people that operated Ford Motor Company. To this extent, maybe it was not necessary for them to have their own reserve so that they could mine their reserves, but it was handy to have their reserves so that others could not stick them with too high a price for these resources.

Therefore, at one time, I went out to find a glass sand deposit for Ford Motor Company, because they wanted to be sure that they had a backup that they could use, so that someone could not charge them a higher price than what they wanted to pay. And this is sort of a psychological thing. If the people that sold them the glass sand knew that Ford Motor Company had their own deposit that they could go to, they wouldn't be apt to try to stick them with too high a price.

So, often you did exploration, but the results were never used. Is that what you're saying?

Well, in this particular case, the results were used, because I found the deposit for them, and they bought the deposit. Therefore, they had it in their back pocket to use anytime they wanted. Oddly enough, to my knowledge, that's the only ore deposit that I ever found all by myself. [laughter]

That was the glass sand?

The glass sand, yes. And it was due to my putting together various information that I obtained from people working in that field. But really, it didn't have much to do with prospecting. It had to do with what you could do with glass sand that was not quite as pure as you would want it to be. I found out from others that it was a very simple operation to wash this particular glass sand that I found, to end up with a very high-grade product. And Ford Motor Company, to my knowledge, still owns that property.

Oh, so that was kind of exciting, I would think.

Yes, it was. It was very interesting to me.

What years were you with Ford in Michigan?

From 1955 to 1969.

And before you went to Ford in 1955 you mentioned that you did some work with your friend Gerry Hartley here in Nevada.

Yes, Gerry and I worked on several things together. Gerry Hartley was the fellow who I worked with on this prospect up in northern California, and he was also involved with the Otis Kittle exploration. Gerry Hartley and I and Pat Willard worked at a sulfur mine out south of Gardnerville. That was mining there, principally mining.

What was your job on that?

I guess I was just a mucker, except that whenever they needed some help on electrical work, why, I came forth with my knowledge. I also did some surveying for them. But, by and large, I was just what they called a mucker.

Pat Willard worked in the plant. Pat Willard, in later years, was the manager for Basic Refractories at Gabbs. Gerry Hartley and I also, by the way, just before the job with the sulfur mine, were involved in surveying with the PWA [Public Works Administration] in Carson Valley.

Tell me about that job.

Well, in order to make work for people, why, the PWA came along. What we were doing on that job was trying to extend and improve the triangulation net in order for proper surveys in much of northern Nevada. I, particularly, was involved around Carson Valley. It was from that job we went to the sulfur mine.

How did the surveying contribute to your knowledge and your skill, because this is road surveying?

No, not road surveying. My work was involved in what they call running levels. In other words, checking elevations between various points in Carson Valley, as well as measuring angles for triangulation in that area. I don't know whatever really became of all of this information. Probably nothing. But obviously that

helped me in my skill surveying, which was always handy. And obviously, it was handy at the sulfur mine, because that made me a more valued employee with the company, and it helped me on various jobs afterwards.

Of course, surveying was always something that they needed at the mines, too.

Yes. The mine needs a surveyor. Actually, it was my surveying experience that made it possible for me to go back to school.

And to finish your degree?

Yes. In other words, I could get enough money to go back to school. I guess I mentioned something about, how in 1938 I finished a job and got a check for \$265, which made it possible for me to go back to school. [laughter]

Did you work for the Nevada Bureau of Mines?

Yes. After working with Otis Kittle, why, Jay Carpenter asked me if I wanted to work for the Nevada Bureau of Mines, principally, because I had had previous writing experience when working with the U.S. Bureau of Mines. And so, I worked with the Nevada Bureau of Mines for about five years, and one of the outcomes of that was my work and publication of *Mining Districts in Nye County*, which came out about 1951. Quite proud of that little treatise.

What's covered in that information that you wrote?

It covers all the mining districts in Nye County, whatever I could find out about the ore deposits or the mineral that had been found there. In other words, I put together everything I could find on every mining district in Nye County, and that, actually, is of some value.

When you say you put together everything that you could find, was that archival information, records?

Both archival records and going out in the field and looking over the area and talking to people. A lot of this is just a matter of talking to people about what they remember about a particular deposit. This information is valuable, because it not only takes the place of the exploration geologist going out to talk to people, but it takes the place of an exploration geologist *wishing* he could talk to these people, because they're now dead.

And so that document has some information pre-1950s of what had happened in Nye County.

Yes, that's right. It goes back quite a way.

Was it only Nye County that you worked on?

I only worked on Nye County. I started working on Esmeralda County, I believe it was. But about that time I left the Nevada Bureau of Mines to take the job at Ford Motor Company. That was in 1955.

When you were writing about Nye County, what types of mines were you writing about?

Everything. Gold—everything. Absolutely anything that I could find about it.

And what kinds of metals were there in Nye County? What were the predominant ones?

Well, principally, it's gold and silver, but there's also mercury, fluorspar. I guess that's about it. It's no different than it is now. Gold is the principal commodity.

So you covered not only what was there, but where it was located.

Where it was located, the best I could describe it. Also, everything I could find on the history of what had been done there previously.

That sounds like it was very interesting.

It was a very interesting job. I just wish that I had gone into a little bit more detail. Now, as I go back through what I had written, I find it difficult to pinpoint just where some of these properties are. But you have to keep in mind, in those days the maps that we had were not as good as what we have nowadays, and, therefore, it was not as easy to describe just exactly where a property is.

So that's something that you've seen improve over the years.

Oh, mapping has improved tremendously. It started improving about the time that I was with the Nevada Bureau of Mines and through the 1950s; and since then, why, it has continued to improve. No, the topographic maps we have now are so far superior to what we had in the past, there's no comparison.

Yes. Tell me a little more about the Nevada Bureau of Mines when you worked there. Was that a regulatory agency, or what was the purpose of that organization?

The purpose of the Nevada Bureau of Mines was to compile and make available information on Nevada mining and exploration. It's now called the Nevada Bureau of Mines and Geology.

And that's the one that's located at the university campus?

Yes, that's in the Scrugham Engineering Building.

OK. So that's still an information resource, and that's its purpose?

Yes, it is.

Which is different from the Nevada State Department of Minerals and Safety and so on, correct?

No regulation whatsoever. It was just there for information to the public.

When did you start seeing regulations coming into play?

Well, actually, regulations, in one way or another, were always here. We had the Mine Inspector's office. And then, I believe that more or less died out. And then, after that, we had federal regulations coming in. I know very little about federal safety regulations now, because I've had no occasion to be involved.

And the same with environmental regulations? Did you have any involvement in that—environmental regulations?

No, I had no involvement. Nobody had any involvement in the environmental regulations. There weren't any. [laughter]

There weren't any when you started out? When did you start seeing those?

I think a lot of that came about when the mine operators themselves decided that regulations or no regulations, it was a good idea to do things in such a way so that it would not infringe on the likes and dislikes of other people. And the first good evidence I saw of this was at the Cortez Mine in Crescent Valley, south of Beowawe.

Was it before you went to work at the Cord Mill?

No, it was afterwards, after I came back.

When you came back?

Probably in the late, late 1970s. I was down in that area, and I was on the west side of the valley looking across to the east side

and the hills there, and I noticed one hill looked rather odd. It looked as though, for some reason or other, someone had scraped the brush off of it, which to me was very odd. And so I went over to Cortez mine, went over there, and, of course, we kept seeing this hill and wondering about it. So we talked to somebody there at the Cortez mine that showed us around, various things they were doing. And I went over to this hill, and I said to the man that was showing us around, "Why did you scrape the brush off this? What's this all about?"

And he laughed, and he said, "Well, that happens to be a waste dump." [laughter] And that was my first experience of what a mining company can do to dress up what's left so that you have the same type of terrain you had before. They had, more or less, contoured or smoothed out this waste dump, and just naturally the sagebrush and so forth grew back—it was growing back—and what I saw was not exactly a barren hill, but a barren hill with very, very small brush on it. Therefore, it looked to me as though they had removed the brush, but that wasn't the case at all. There was a waste dump where the brush was beginning to grow back.

So, eventually, it was going to look just like . . . ?

Look just exactly like all the rest of the terrain around there. And that was a very pleasant experience for me to see what could be done and what companies are doing to dress up what they leave behind.

You appreciated that. Is that correct?

Yes, I appreciated it, although I see nothing wrong with seeing a waste dump just by itself being left. But anyway, others do. And as long as other people don't like it, why, there's no great difficulty to smooth out those waste dumps and contour them, as they say, so that the slopes are a little bit flatter. And then, brush comes back. Of course, nowadays, they're not waiting for the brush to come back. They actually reseed them, which is a good idea.

Which is quite a difference from when you were first working in the 1930s out in the field.

Well, it's unfortunate that in the past we have left things the way we did. We'd sink a shaft and walk off and leave it. That's not right, and we have to try to continually think of safety for the people who follow us. I remember in the Upper Peninsula of Michigan, we had some of these open shafts around. I always hate to see a shaft filled, because it means that you can no longer get down there to inspect the ground. But on the other hand, it's a pretty dangerous situation to have an open shaft. And I've seen some places where the brush was growing around the shaft, so that you couldn't even actually determine where the edge of the shaft was—a very dangerous situation. There, as here, we are fencing these shafts. But in the Upper Peninsula they started filling some of them. So I hate to see it happen, but sometimes it's necessary.

OK. You've just gotten back from being out in the field this week. When you go out, from time to time, do you still see some of these open shafts?

They're pretty well fenced now. Everything I see now is fenced. It's fairly safe.

Because there has been a big effort, I understand, by the Department of Minerals and several organizations, or maybe corporations, to try to correct that.

Yes, that's right. The Department of Minerals, or whatever it's called, is actually fencing some of these. On the other hand, they're fencing the ones where the owner is not known. But where the owner is known, why, the people that own the property are fencing them. These are great strides that they're making. A small mine operator, that doesn't amount to very much, but I keep thinking about I recall when I first heard about these plastic pipe posts being used for claim markers, and the comment was made that they kill birds. I just pooh-poohed the idea. I couldn't under-

stand what they were talking about. Well, I had occasion to have to move some of these posts in northern California, and lo and behold, I found the dead birds at the bottom. The bird, for some reason or other, dives down in there and obviously can't get out. And therefore, they do kill birds. That's why the BLM now states that these posts have to be capped or not used.

And nowadays, because of change in mining regulations, we can use two-by-two posts to mark our claims. It's no longer necessary to use these plastic pipes, and just as well we don't use them.

Yes. So some of this has been a kind of a learning process along the way.

Yes, it's a learning process all the way along.

New plastic pipes come out, and they seem like a good idea, but then . . .

Oh, yes. I used them myself, and I just couldn't understand how birds could be killed, but they are.

Did you ever leave an open shaft? I mean, you talked about some of these things.

Well, I was thinking about that.

Or were you ever at the end of an operation where that would have happened?

Yes. Well, I recall one shaft we sunk in the Bottle Creek mercury area out of Winnemucca. I think we sunk that down about thirty feet. I don't know what was left, but I have an idea that was left open. I don't think we mentioned anything about that earlier.

On the other hand, I had occasion in the Upper Peninsula of Michigan where, when I first got there, at one very deep shaft, one of my jobs was to clean up that particular property. And we had a contractor come in and remove the head frame and then

cover that shaft. It was rather large. It had to be covered with steel beams and concrete, so we capped that shaft. Now it's absolutely safe. So here and there, why, I had a little bit to do with both ends of the problem.

You've seen all the changes.

Yes, I've dug the shaft and probably left them open, and on the other hand I've capped others.

Have you had any involvement with the Nevada Mining Association? Are you a member?

Yes. I'm what they call an associate member, I guess, and have been for many years. I don't really know a great deal about the Nevada Mining Association. I know the people in it. Obviously, they try to help the public become more aware of the importance of mining.

What I like particularly about the Nevada Mining Association is they put on these classes for the teachers to teach them a little bit about the importance of mining in Nevada. For about eleven years or so, I've had quite a bit to do with publishing an historic mining calendar. We have cooperated with Nevada Mining Association by making calendars available to these teachers. I think that's a very good idea. I don't know of any place where we can do more good than to help teachers understand something about mining, because, after all, they're coming into contact with the youngsters, who should realize what mining is all about, why it is necessary.

Mining education is starting to reach into the grade schools. That's new in the last few years?

Yes, that's very new and a great idea.

When you were back working at the E.L. Cord Mill, was there the same need for public education that there is now?

I don't think there was, because people were more cognizant of the importance of mining. After all, the kids' fathers probably had something to do with mining, and that's what put the bread on the table. Now life is so diversified that the parents know nothing about mining.

The source of the products is further removed than it was when "your dad" was down underground mining, yes?

That's right. The kid doesn't realize how much is involved in mining when he turns on a light switch.

FRIENDS AND FELLOW MINERS

W*E WANTED to talk a little bit about your friend Gerry Hartley. You've known each other for a number of years. Tell me a little bit about how you met.*

Gerry and I were both going to school in 1930.

This is at Mackay School of Mines at the university?

Yes, at the University of Nevada. Gerry was staying at the Beta Kappa Fraternity House at 518 University Avenue, and I was living at home with my brother. I had a 1926 Chevy Roadster that I had started overhauling. The summer vacation period was upon us, and I had to put that thing together so I could go off to a job. I was in the backyard putting it together, and Gerry was around. I needed some help, so he gave me a hand with that. And that's about the first time Gerry and I got fairly well acquainted. After I got the car back together again and everything was all right, why, I found out that, with the school year over, Gerry was going to head back to the Bishop area where his father was operating a small gold mine about thirty-five miles north of Bishop. I,

simultaneously, had obtained a job, on paper at least, to go to the B&B Quicksilver property on Montgomery Pass. Well, that property would be en route to where Gerry was going, so I suggested that Gerry come along with me, and I just take him over to his job and then come back to the B&B Quick.

Well, it so happened, when we got to where his dad was working in this little mine, why, I was intrigued by what was going on. They seemed to think I was acceptable to work there, so I just stayed there, and I never did get to the B&B Quick. All I've ever seen of that property are pictures. But I worked with Gerry then at what was the Lone Star Mine, not only that summer, but for quite a bit of the next year, because I did not go back to school.

Was he also taking a mining engineer degree?

Oh, yes. Gerry was the same as me. He was going to school in mining.

Yes. And did you do the same kinds of work at his dad's gold mine, or did you have different areas of expertise that you were interested in?

Well, we started off by getting prepared to sink the shaft from 300-foot depth to 400-foot depth there, and that required a lot of upkeep and various maintenance jobs around the mine until this could be done. Gerry's dad was more or less looking after this at the time, but he also spent quite a bit of his time away from there, so that left Gerry in charge. Gerry, although being a relatively young man—not even twenty-one, as I recall—had quite a little responsibility, but being as how he had worked so many years with his dad, he was capable of the responsibility. I found I learned a great deal from Gerry.

So he had a lot of experience before he ever went to school?

Gerry had experience from the time he was in grammar school, I guess, in the Seven Troughs area and the Searchlight area.

And this was all working with his dad?

For his dad and his grandfather. Gerry has told me about his first work in the Seven Troughs area helping his grandfather. He was just a little kid, and his grandfather explained to him how to hang up the stamps in a stamp mill so that the operation was just coasting instead of actually stamping.

Really? He taught that to a child?

Yes. And it was a rather simple thing, but you can teach the child, I guess, to keep his fingers out of the wrong places and what to do.

Are you talking about how to hang them in a certain manner so that they worked efficiently?

You see, the stamps are going up and down, and you have a piece of wood that's about like a two-by-four, about eighteen inches to two feet long. When the stamp is up, you jam this wood under part of the stamp column. And that hangs it up so that then the cam is flowing free, and there's no more dropping after that. For each particular stamp, you had to do it.

And why do you do that?

If, for some reason or another, you want to stop the grinding for a while—you might have to clean up a screen or something—and you want to quit the splashing of the grinding, why, you hang up the stamps.

So its something that has to be done even while the mill is running?

That's right.

You have to stop particular stamps to do some other jobs?

Yes. Most batteries are five stamps. And what the man does is, he hangs up each one of those five stamps, and then he can get down and work on the screen or whatever is necessary. Or he may have to work on the plates below the screen.

And you say a battery is five stamps. What does that mean, battery of five stamps?

Well, usually, it means that a segment of the stamp mill has five stamps in it, and that is called the battery. Next to it might be another battery, and they would all be operating more or less off the same shaft.

So they don't function independently, each of those batteries? They all function as a whole. You might have five batteries that function as a whole?

Yes, that's correct. They function together. Battery means a group.

Group, to designate which group you're working with?

Yes, that's right.

So, when he hangs up the battery, that's to clean the screen or whatever.

He might. You see, each battery has its own plate below it and its own screen, and he may have to clean that screen. You know, there's a lot of stray wood gets in with the ore, and wood chips, actually, will eventually block the screen. And that's one reason to stop and hang up the stamps—to clean the screen.

What else would be required?

Well, that's about the only thing I recall that Gerry told me of his very, very early days. It was his grandfather that taught him.

Is that a dangerous thing to do for a young kid?

Yes, it could be, because you could get your fingers in the wrong places there very easily if you aren't careful. On the other hand, it's fairly safe if you just watch what you're doing. These sticks that you hang up the stamps with have a metal handle on them, and it's very simple. They're also hinged. All you have to do is, at the right time, push it in there, and that's all there is to it. He remembered that. Yes, he also told me other interesting things. He was there at the time Seven Troughs had a very serious flood one time. I don't recall the year now, but anyway, he told me about that.

He saw that?

Yes, and in regard to the people around there, he mentioned a teacher that came in there to a one-room school, and she was a little bit hesitant about being alone in that area, and one of the old miners told her one day, "Lady, you're as safe here as you would be in God's hand." [laughter]

How did he mean that? Why would she be safe there?

Because the people were that type.

Would not bother her?

No, absolutely not. No.

Is that true of mining communities in general?

Yes, very definitely, it's true. They all stick together, and their ethics are pretty high, if we come right down to it. They may not be when they go to town, but when they're in camp, they're pretty fine people.

So a teacher, as long as she didn't hang around the bars when the miners were off-duty, she'd probably be fine—is that it?

Yes, she'd be in great shape. In Seven Troughs there certainly were no bars to hang around. [laughter]

So that's interesting, you know, because in most communities today women are not safe.

Yes, that's correct, correct. They have a problem, yes.

Yes. But in a mining community, generally speaking, at that time, they were safe? Or do you think it still applies today?

I still think it applies to small communities today. People kind of look after themselves, make sure that everything is on the up and up. It's when you get into larger communities you run into problems.

Because there's really a sense of helping each other in small communities?

Yes, they do help each other very much.

Yes. And do you think that's as much a function of small communities as it is of the mining communities in general?

Oh, yes. I don't think it makes any difference whether it's a mining community or whatever. Small communities are very helpful to each other.

Yes. It just happens that most mining is around small communities.

Yes, that's right.

But you're also kind of touching on the idea that miners in general are fairly ethical people.

Oh, they are. They're definitely ethical, and they may go to town and carouse around, but when they're in camp, why, they're OK—fine, fine, ethical people.

You've probably known quite a few over these years, and you found them for the most part to be really good people overall?

Yes. Well, all the miners I've picked up from the jungles to go out and work, they're all fine people. In Depression years I ran into some who were quite well-educated, too.

Yes. They were simply out of work.

That's right. Difficult to find a job.

Right. Let's go back to your relationship with Gerry. You two obviously really hit it off, and you said you learned a lot from him when you worked together.

Well, Gerry, you see, learned from his father and grandfather about mining, and he worked around these small operations. Therefore, Gerry ended up being a small mine operator, you might say, which is a rare breed and very rapidly dying out. And in these small operations everybody had to know or learn how to do things for themselves. You didn't have the opportunity to go down the street and have someone else do the job for you; you had to do it yourself. So I learned a great deal from Gerry that way, and then Gerry and I worked together in so many places.

At the time I had the accident with my eye, I was being taken care of by a small hospital in San Francisco, and Gerry and his dad were living in Oakland, so I stayed with them during this particular time. When that was finished, why, Gerry and I came back to Reno looking for whatever jobs we could. And that's when Gerry and I and another Mackay graduate, Pat Willard, and Paul Turner, if I remember right, got a job doing some sampling at the Longstreet Mine, working for a very noted geologist whose name is Albert Burch—well known here in the West.

And what was he known for?

Well, he was just a good geologist—good, conservative geologist—and a mining engineer, if you wished to call him that. It didn't make any difference. He just had a good reputation, that's all.

And so, at the Longstreet Mine, the four of you went to work with him, and what happened there?

The mine was supposed to have a certain amount of a particular grade of silver ore. We channel-sampled those drifts there, and we learned a lot from Albert Burch about how to properly channel-sample and split samples and so forth. It was new to me, and I was very happy to have the opportunity to learn something about good sample techniques.

Could you describe that to me?

Well, the rock is hard. You're using a three or four-pound hammer and what we call amoil—it's about an eight-inch piece of drill steel that's sharpened at one end. You actually cut a channel of the hard rock about four inches wide and maybe three quarters of an inch deep, or something like that, and this mass of material is dropped onto a canvas. Then, after you have your sample, you have a chunk of iron of some sort as an anvil, and you manually—with your hammer and the anvil—break every piece of rock down to about a half-inch size. When it's all broken down this way, you roll it on the canvas. By rolling it, I mean you pick up one corner of the canvas and roll the sample to the opposite corner and so forth. You're rolling the sample, mixing it up, and then you drop it on the floor and very carefully separate it into four parts. You save the opposite quarters as your sample and throw the other two quarters away. Then, if you still have too much material, you take what you retained in these opposite quarters and roll that again and take half the sample in the same way.

I see. So you end up getting a more random sample by mixing it all together.

Yes, you get a well-mixed . . . yes, random sample of silver ore.

Random, maybe kind of an average.

Yes, average sample. There's no tendency for the rock from one part being separate from the rock from another part. It's all mixed up together very carefully. It's a very typical way of sampling. We sometimes refer to it as coning.

It is something like coning and quartering a sample, where you roll the sample into a pile. Then you flatten the pile out, and you divide it into quarters. One quarter would be a sample, and then you work with that and throw the three quarters away. Or you could keep half of it, if you wanted, and throw half of it away. But anyway, by rolling and then making it into one pile and flattening that pile, dividing that pile into quarters and then taking either one or two quarters, you end up by having a pretty good sample of your bulk material.

Are there situations where you would use one method over the other?

They're both so similar. There's no difference. They're considered equally. Nowadays, though, you're very apt to have a splitter, whereby you'd dump this material into a splitter, and that splitter takes out half of it, so it's half of it one way and half of it the other way. It's a mechanical device, you might say, to do the same thing. But the coning and quartering, as we were doing there, is a very, very old system. Maybe it goes back to Agricola, I don't know. [laughter] [Gnaeus Julius Agricola, A.D. 37-93, Roman general, governor of Britain],

And was the channel sampling a newer method?

No, the channel was very old. The idea is to take a certain measured quantity of the rock off the wall, and by taking a channel, let's say, four inches wide and about three quarters of an inch deep, why, you're doing just that.

You're talking about Gerry being a small-mine operator and that you learned a lot from him. I want to kind of go back to that, if that's OK. It sounds like a small-mine operator has to know a little bit about everything.

Absolutely.

Could you describe some examples of that for me—maybe thinking back to some of the things that you learned that summer with Gerry at his dad's mine, the Lone Star Mine?

Well, the small operator has to have safety always in mind, and in this particular case, as I said, we were getting prepared to sink. And then, when we were actually in sinking operation, why, you'd have to be so careful that men do not hurt themselves; because, remember, they're in the bottom of the shaft—over 300 feet deep—and the shaft was open up above and then down below. You've got to be careful that nothing drops down that shaft—no pebbles, nothing—because it could be very dangerous. And when you're going down the shaft in the bucket or on the crosshead above the bucket, why, you inspect the wall plates, make sure that there are no rocks laying on the wall plates, because these rocks could be dislodged and dropped down on the men who are working down below. All these things are very important.

Of course, you also have the responsibility of keeping the pumps going that are pumping the water out of the bottom of the shaft so that men can work there. It's a very difficult proposition when you're sinking a wet shaft, as you're fighting water all the time, and you're working in water. You've got to try to keep the water in one part of the bottom of the shaft as best you can, so that you can drill without too much difficulty in other parts.

How did you do that in that particular shaft?

Well, with the little bit of muck that's in the bottom, you try to hold the water over to one side of the shaft while you're working on the other side. Best to have the suction from the pump in that lowest part. It's a difficult proposition. You very often have to do so much improvising. I remember so distinctly, when a gear on the hoist gave out one time. We had a welder in our group, and he had to improvise by making new teeth for the gear teeth that were ripped out. And it was very cleverly done, very time consuming. But anyway, it was done right on the job.

It isn't the kind of thing where you can run into town and get a new gear?

Absolutely. You're thirty-five miles from town, so it takes quite a while to get there.

Plus, that town might not have the precise part that you're looking for.

Yes, they may not have any more facilities than you have.

So it's important to have the ability to fix these.

Yes, and have a few simple tools, so you can drill holes in the gear and so forth.



Vic, you just mentioned that we've covered some terms that we might not know.

Well, I used one word, which is a "crosshead." The shaft cable goes through the crosshead and is bolted below the crosshead. Well, the cable goes through the crosshead, and it is attached to the bucket below, but the cable is bolted in such a way that the crosshead is held, oh, several feet above the bucket. And the purpose of the crosshead is to keep the bucket right in the shaft without getting around to hitting the timbers. Of course, the cross-

head is running on the wooden guides on opposite sides of the shaft, so it slides down very accurately in the center of the shaft, and it keeps the bucket right in the center of the shaft, too. But when men are going up and down the shaft, they can either ride the bucket or they can ride on the crosshead, and we would ordinarily ride on the crosshead. It was a little simpler that way. And, as I mentioned, we'd watch the wall plates and make sure that there are no rocks sitting on the wall plates.

And the wall plates are where?

The wall plates are part of the shaft timbers. They are the long timbers. As an example, this is a one-and-a-half compartment shaft, and the wall plates are about eight feet or more in length. They stretch from the five-by-five part of the shaft over to the part of the shaft which has the manway in it, and it was only about two and a half to three feet by five.

OK. So you're saying the "five-by-five" and the "manway." Now these are also new terms to me.

Well, the one-and-a-half compartment shaft, as an example, would be split in two parts. The ore chute is the five-by-five, but right alongside of that is what we call a manway, and that's where the ladders are, and that's where the piping goes down.

You learned a lot. I keep coming back to that, because I'm struck by the fact that Gerry came from a mining family, and he was learning from two previous generations; whereas, you did not have mining in your background, as far as you knew, at that point. Am I correct?

Yes, that's correct.

Yes, so this must have been just wonderful for you.

Oh, yes, I enjoyed it very much, and I was very open to learning anything I could. I soon learned, when you're working around

mining—underground operations—you don't fool around. You don't do things that are unnecessary. You always have to have safety in mind. And I don't know whether I've mentioned this before, but I recall so distinctly one time going down the shaft on the crosshead, and, as a kid might do, I was tugging on the cable above the crosshead. I noticed I could make a cable whip in the shaft. That's kind of intriguing to me, but I don't know why. And when I got to the top, why, I was informed in no uncertain terms by Gerry that one doesn't do that. You don't mess around when you're underground, because the person at the top sees this cable whipping, and he doesn't know why it's whipping, or whether you're trying to signal something to him, or just what. So you don't do things that are unnecessary like that.

That was something that you learned from Gerry?

Yes, I sure did. Well, I was a kid. I had to learn about that. That's all there was to it—that you don't mess around.

And for a small-mine operator, the safety is so important, because it's not only his own personal safety, but for everybody that's working for him.

Yes, and there's no medical help right there, either.

What did you do? Were there any injuries there?

No, no, never.

You didn't have any. Did you have first aid available? Did somebody know about first aid?

Oh, yes. We all knew something about first aid—not very much. No, not much was said about first aid. Just be careful, that's all.

On that project there were no problems. You didn't run into any injuries or any problems?

We had no problems, whatsoever.

So, looking out for the safety really worked there?

Yes. There were plenty of opportunities for problems though. We had engines that were supplying power to compressors and generators and all run by flat belts. These belts can be treacherous, too. And if an engine stopped, why, you had a method of turning the flywheel of the engine backwards against compression and igniting the chamber to try to start the engine. And it was tricky. They had a potential for danger.

But you managed.

And we managed everything. No problems whatsoever.

What other things do you remember specifically from that—incidents, lessons—that you learned there at that Lone Star Mine.

Well, I recall that we used distillate for a fuel there. Distillate is kind of a cross between kerosene and gasoline. That was our fuel for the engines. The top man kind of looked after the equipment while the men were underground. Why, keep in mind that there's a hoist man working in the hoist by himself, but there's a top man who's looking after the equipment and also helps the hoist man when necessary around the shaft. The so-called top man is also fueling the equipment as it's operating. Every so often, we would take a five-gallon can and set it near our large tank of distillate and open the spigot to fill the five-gallon can. While that was filling, we'd be doing something else. Every once in a while, we'd forget about the distillate running into the can, and then we'd have a flood of this distillate all over the ground around there. Although distillate does not evaporate as readily as gasoline, and it's not as dangerous, still, it will burn. Several times we'd have a flood of this distillate on the ground there when the top man forgot all about it. That was a little incident that always bothered me, that I had a part in that dangerous stuff being all over the ground like that.

For fear of fire starting?

Yes. The stuff will not ignite like gasoline does, but it's bad enough. I know it doesn't ignite as well as gasoline, because my little Chevy Roadster that I had there at the camp, why, in lieu of gasoline, I would put some distillate in the gas tank, but always mixed it with gasoline. And a 50/50 mix wasn't too bad, but when you started putting much more distillate in, why, you had trouble. This automobile doesn't operate properly. [laughter]

Is that part of why you had to tear this Chevy apart—putting distillate in it? [laughter]

[laughter] No, no. Tearing the car apart was before we got to that point.

From the mine that Gerry's dad owned outside of Bishop, where did you and Gerry go from there?

I finally went back to school.

Yes, and did he stay at the mine, or did he go back and finish school, too?

No, I believe Gerry went on to other jobs, and I don't know where they were.

What happened to that mine? Was there nothing there?

It eventually just sat there, and nothing ever happened.

There wasn't enough there to work?

No. It took a lot of money, which we couldn't raise, to keep that going. And there was not enough ore there to warrant anything being done, although we did take out a little bit of ore, which I understand was later milled by a small mill placed on the property.

Who was in charge of raising money? Was it Gerry or his dad?

Gerry's father.

His father was out trying to raise money.

Yes. He was pretty good at that. He had quite a few contacts back in New York. He raised a little money.

So it was mostly trying to get funds from investors in the East?

Oh, yes, that's right.

This was in the 1930s. Was that kind of where the money was for mining in general? Do you know, or was that something you weren't focused on at that point?

I don't know. I guess there was money there. There wasn't much money anywhere for that matter. Remember, we're talking about 1930, 1931.

Depression years.

Yes. Then, it wasn't long after that, I guess, Gerry and I and Pat Willard worked on some survey crews under what was called the PWA, one of the alphabetical organizations set up to make work for people, and we did a lot of surveying in Carson Valley. Then the sulfur mine, the Leviathan Sulfur Mine, opened up, and they were producing sulfur out of the ore there and shipping it to wherever. I think the market for sulfur was pretty good at that time. And the three of us went out there and got jobs. Pat Willard was the only graduate. Gerry and I were just miners and muckers. Oddly enough, Pat Willard, who was working in the sulfur plant—I guess they weren't quite satisfied with his maintenance of the equipment or something. Anyway, he got fired, and Gerry and I were just about ready to leave, too, but the management talked us out of it, so we stayed a little bit longer. Pat Willard later went

to Gabbs and, eventually, was the manager of Basic Refractories at Gabbs.

You talked about the market for sulfur being good. The market played a big role in where you could find jobs, is that correct?

Yes, very definitely. In later years, why, it was a good tungsten market that made an opportunity for us to work in tungsten.

When did you work in tungsten?

Well, that was after the war.

After World War II?

Yes.

OK. So that was a strong material, then, and sulfur was before the war?

Oh, yes, that was before the war. I think it was used largely for agricultural purposes, although I don't know. Before I ever worked at the Leviathan Sulfur Mine, I often saw a bin at Minden that had raw sulfur in it. I knew it was sulfur, but I didn't know where it came from, or where it was going for that matter. But it was later that I worked at the source of this sulfur.

So you did some sulfur mining together with Gerry, and then, what was your next adventure with him?

Although Gerry and I worked on quite a few jobs together, why, quite a bit of the time he was in one part of the country, and I was in another part of the country working on different jobs. As best I recall, after Leviathan Sulfur, why, I got a job at the Silverado Mine south of Wellington in the mill. It was a cyanide process mill handling silver ore from nearby Silverado Mine. Gerry was not on that job, at all. It was on that particular job that I gained my first experience in cyanide milling.

So that was before you went on to Silver Peak, where you also worked on the cyanide. So, Gerry was off doing other things. Tell me how that happened.

Oh, he could find a job someplace, and I'd find a job somewhere else. It was just wherever you could find work, that's all.

Yes, the market and economy had a lot to do with that, because you said certain mineral prices were up.

Well, I don't know just what. Times were still tough. Remember, this is around about 1935 or something like that.

The Depression has really been around for a while by now.

Oh, yes. Things were tough. Well, I don't know just why I left the Silverado Mine. Anyway, I was there for several months.

Let's talk about the tungsten. Did you work with Gerry in tungsten mining after the war? Tell me a little bit about that.

Yes. It was after the war, why, a fellow that I went to school with, Otis Kittle, had a little income from iron mine royalties in Minnesota, and he thought it might be a good idea to set up a little exploration company, which we did—Gerry Hartley and John Wells and I. A geologist named Stevenson was also involved.

We first looked for more mercury in the Bottle Creek district out of Winnemucca. We weren't successful at that, but then John Wells and I kept looking for other places where we might be successful. One place where we spent quite a little effort was a little lead-zinc property near the junction of U.S. 395 with the road that goes to Wellington, about fifteen miles south of Gardnerville, and we worked that for a little bit. We found a little more ore, but it really wasn't worthwhile.

And then, about that time, I guess, Gerry joined our group, and we looked into tungsten near Bishop. The tungsten price was good then. So we knew the owners of a small tungsten mine that was lying dormant near Bishop, and we went out there and were

able to mine some tungsten out of this. We also rented a small mill there and concentrated it, as well, and sold the tungsten concentrate. Gerry looked after that mill and the cleaning of the concentrates, principally. Did a very good job at it.

So he was kind of in charge again.

Well, he was in charge of the mill, very definitely. Yes, and he and I together, more or less, figured out what to do at the mine. But Gerry was the best head, so far as the mining was concerned, too. And simultaneously, why, we were able to purchase an underground diamond drill, and we used that there on the tungsten mine to try to find an extension of the ore, but we didn't do very much good with it. We found more ore just by following what we knew was there. The diamond drill didn't help us, at all, because we just didn't drill in the right places.

The equipment would have worked if you had gone to the right spot? [laughter]

That's exactly right, yes.

All right. Well, that sounds like you kind of started another project then, all of you.

Yes, we did.

You said you started an exploration company. Was this part of that?

It was part of the same exploration company. At this particular time we were concentrating on the tungsten. We couldn't find anything else, and the tungsten price was good, so we stuck to that.

So were Otis and John there with you and Gerry?

No, Otis was never on the job. I think he was in San Francisco at that time. I don't remember.

He was still a part of your business, the financial partner?

Oh, yes, he was funding the project.

John was there with you all, working on this project.

Yes.

And then, did you hire some people to work there?

No, we didn't hire anybody. We did everything ourselves. Oh, wait a minute. Yes, we did. Yes, at the mill Gerry hired a young man who had experience with that particular mill, and he and Gerry together ran the mill.

I see. And you and John did more of the work on the mine, with Gerry's help.

Yes, that's right.

So it was really a small operation.

Very, very small.

Did you end up making any money on that project?

I don't think we made any money. If we made enough to get some of the money back that had been spent, why, we were lucky. In the overall picture, we didn't make any money on anything.

Anything? Ever, that you did on your ventures?

No, not on those ventures.

Really? So what did you do for a living wage then?

Well, the arrangement was that Otis Kittle would put up the money for us to get by on, and that's all it amounted to.

So that would take care of any overhead costs and your food?

That would take care of bread and butter, you might say, yes, for us to live.

The old grubstake idea, basically?

Yes, that's all. Yes. Our arrangement there was to get a little bit per month, and then if we found anything, why, that would be another situation, that's all.

Yes. But you never got to that level.

That did not develop at all.

OK. With this particular company, this exploration company, what happened after the tungsten mine? Did this group stay together? Did you continue?

No, that was the end of it.

That was the end of it, because you weren't having any success?

That was of the end of the whole thing. Yes.

Was that your only experience with tungsten mining?

Yes, that was my only experience. Gerry had a long experience in tungsten, working in tungsten mine and milling and so forth over these years. He was a kid around World War I—well, shortly after World War I. As a kid, as a very young man, why, he worked at the tungsten mine out of Bishop—a large tungsten mine referred to as the Pine Creek Tungsten.

So that was kind of the beginning of his tungsten experience?

Oh, his tungsten experience started, yes, as I say, right after World War I there.

We were talking about the Lone Star Mine, and you talked about the welder who fixed . . .

Yes, I mentioned Norman Annett. Oddly, Norman Annett was going to school at the time, and he was at the Lone Star Mine for just the summer, but he was working both as a mechanic, as a welder, and also as one of the hoist men there. Actually, he was putting in a double shift every day. His idea was that, whatever money he could make would make it easier for him in school the next year.

While Norman was going to school at the Mackay School of Mines, his wife was working in a jewelry store in Reno. Any money that Norman could earn during the summer was very important to him. Therefore, his working a double shift at the Lone Star Mine was rather rough, and you have to give him a lot of credit for doing it. He worked one shift as hoist man and another shift when necessary, I guess, to do welding and various mechanical work. And he was the one that very cleverly designed, or figured out how to repair gears when the teeth had been ripped out. He drilled holes into the remains of the gear and screwed bolts into that to act as part of the teeth. Then he would build the bolt up with a welding torch to make the teeth. After that, he'd have to grind the excess out. Anyway, it was very time consuming, but we had no other source of replacement. Just an example of how you'd have to have considerable innovation sometimes out in a small mine.

It's really important to have talented people available.

Yes, that's right. Imagination. People could imagine how to do some of these things.

Right, and some independence, I would think. You know, not thinking that somebody's going to come to help you, but how can I fix this myself?

Oh, yes. [laughter] It reminds me of a first-aid course I took when I was in Michigan during the time of various bomb scares and so forth. This course was designed to teach you not what to do before the doctor got there, as you do in first aid, but what to do when you knew the doctor was not coming. [laughter] And this sort of makes me think about that. They fit together very well.

Because there was no doctor, and because there was no replacement coming.

No doctor, no mechanic was going to come! [laughter]

You guys were on your own out there.

Yes! Absolutely.

Do you think that's still true today? Is that so much a factor today as it was in the 1930s when you were working on those?

Oh, today you have so many facilities around to use. You can usually take equipment to somebody that can handle it. You have all kinds of shops around.

So the repair work is still done rather than reordering pieces, but there are various places to take it. Transportation is easier.

Yes. Well, now you have the ability of reordering and getting it by plane quickly or having a shop that can make it over.

Within driving distance, probably.

Yes, that's right. Oddly enough, very few people know this nowadays, but the V&T shops in Carson City were extremely important to the mineral industry in Nevada and eastern California because of the facilities they had there to make various things.

To make some of these parts?

Yes, that's right. And I remember that, somehow or other, someone had to have a crankshaft rebuilt or re-babbitted or something like that. That's the place where you would go—the V&T shops in Carson City.

Did you have occasion to go there?

No, I never did. I knew about it and talked to the people that made use of that all the time.

I was wondering about a term you used, "re-babbitted."

Yes. Re-babbitted means replacing the babbitt that has been destroyed in one way or another in a bearing. That babbitt is molten metal which is poured into the bearing. In other words, the bearing has to be set on the crankshaft first, properly, and then just pour the molten metal in there for the re-babbiting process.

And this is one of the things where the V&T shops were helpful?

Yes, it was very common for the V&T to do that.

What other things were they helpful with?

Well, they had good-sized lathes, so they could make equipment when necessary.

OK, so they could actually create it—design it and so on?

Yes. That's right. They were wonderful facilities for this part of Nevada, particularly. Of course, I guess you had facilities something like that at Kennecott Copper out of Ely. That's in the extreme eastern part of the state.

And they had similar facilities to the V&T?

I'm quite sure that Kennecott would have had the same facilities there.

Were there other things that you remember from those early experiences with Gerry as the small-mine operator? It sounds like he was in many ways a teacher to you.

Yes, he was. Of course, I had known Norman Annett before that time and knew him until the time of his death the last few years. And by the way, Norman continued to be that type of person that could, by himself, do many things that were necessary. After all, he set up the Twin Lakes Resort area out of Bridgeport and all of the various things that had to be done with that, including sewage treatment, and all kinds of things.

And his training was in mining engineering, also?

Yes, he was trained as a mining engineer. He was a member of my original class, which was 1932, which I did not make because I stayed out of school too much. But he graduated from Mackay School of Mines in 1932.

Yes, so he and Gerry were both people that you kept in touch with over the years?

Oh, yes, I did. Been in close touch.

You've had some really important friends in the mining industry: Gerry, Norman. You've talked about Pat Willard several times.

Yes. I had mentioned Pat Willard. In later years, why, he was manager of Basic Refractories installation at Gabbs, and then he contracted some kind of a nervous disease, which eventually completely incapacitated him. His wife, Clara, who was from Maine, took him back to Maine, and that's where he died. And when Juana, my first wife, and I went back to Maine in 1972—we were there from 1972 to 1975—why, we contacted and met with his

widow, Clara Willard, several times. I was in Maine working for Hanna Mining Company as a landman, obtaining leases for land for the mining company.

It sounds as though—and this is not unusual today—there are a group of friends that you’ve made through mining that eventually became scattered all over the country, going to various jobs, but you’ve all stayed in touch.

Yes, that’s right.

Important friendships.

Yes. Or in some cases we lost touch, but picked them up again.
[laughter]

IN ABOUT 1936 or 1937, there were two women graduated in mining engineering. One was Betty Bowman, and the other one was Jean Horning. They are both mentioned and pictured in the 1997 Historic Mining Calendar. I just put Betty Bowman on the plane the other day to go back to Los Angeles. She was up here for, I guess, about her sixtieth reunion since graduation from the Mackay School of Mines.

Did she continue in her work in mining?

She did for a while but not very long.

What did she do? What was her experience? Do you know?

Well, she worked in Alaska for a while on property, and I don't know just exactly where she worked. Keep in mind, she was way ahead of her time as far as being in mining. You have all kinds of women in mining now. But I remember so distinctly discussing this with her when she was going to school. The time she was going to school here, finishing school, I was working for

the state highway department. But living in here and having contact with the school quite a bit, why, I met her. I remember talking to her one time, and she said, "You know, I sometimes wonder if I'm a square peg in a round hole." And I always remembered that.

Because there just were not many women?

Women were just not into mining.

Right. Were those the only two that you encountered during your early years?

Yes, there were no others.

It was much later before women really came into taking mining courses. How was it for them in school? What was the reaction to them?

This is a very interesting question, and I've thought about it a lot. I remember so distinctly a couple of fellows talking about Betty Bowman. She was a very good student in school, always had good grades, and she knew what she was doing all the time. One of the fellows said something about, "How would you like to be in the mining industry married to a girl like Betty Bowman?"

And I guess one or the other of them said, "How would you like to be married to someone that knew your business better than you did?" And that always stuck to my craw, being the most idiotic, chauvinistic statement that I'd ever heard.

You mean, at the time, that's how you felt?

Yes. It shouldn't exist at all. It was stupid. I've mentioned that to other men since then, and most of them are wise enough to say, "I think it would be a good idea." And the idea would be a tremendous help to them.

Yes. But at the time, the attitude generally wasn't there.

The attitude wasn't there.

Your attitude was probably unusual, would you say?

It probably was. Of course, I was a little bit older than some of these students, too, at that particular time. But I thought it was stupid.

Anyway, Betty Bowman went on to marry a businessman, although she kept her interest in mining, and she still is interested in mining. I send her articles once in a while about mining, and she asks me about others. She didn't do very much in the way of She was not involved with the mineral industry after that.

What about Jean Horning? Did you keep in touch with her?

Well, Jean Horning, I believe she was on the editorial staff or worked with one of the mining magazines for a while, and then she did something else in the mineral industry, but she is now deceased.

So she worked, but not necessarily out in the field? She stayed in the industry?

Yes, I think that's what it amounted to.

OK, so they would have been some of the early pioneers as women in mining.

They definitely were pioneers.

And when Betty said that to you, about being a square peg in a round hole, do you know what made her say that? Was she having a hard time in some way, or did she not see what her future was going to be?

She was smart enough to realize what was going on around her, and she just couldn't figure out how she was going to fit into

the industry when she got out of school. It was largely due to the help of Frank Hunt, who was quite a benefactor to the Mackay School of Mines, that she was able to work in the mineral industry after she got out of school.

He helped her in some way?

Yes, he helped her. It was some kind of a connection with the property, and I think it was in Alaska, whereby she was able to work on this property. In the last few days, because Betty Bowman was here, I could think about this. I was thinking of another instance. There was a girl (I don't remember her name, and it doesn't make any difference) who graduated from Michigan Tech. A very good student, and there was a problem with her, where ordinarily men would go out to a camp in the field and work out of that camp. In her particular case, they had to ferry her back and forth in a helicopter to the job. So it wasn't until more recent years, say, ten or fifteen years, that women had a place in the field. It was difficult for her.

So prior to about the last ten or fifteen years, did you personally work with women in the mining industry?

Yes. Yes, I worked with one at the VEK Associates in the work we did out of Battle Mountain. We hired a few people, and one of them was a woman, and she did a tremendous job.

What did you hire her to do?

Sampling.

Was she a mining engineer? Was she a geologist?

No, she just took a lot of courses in geology, I guess, or maybe she had a geology degree. I think she did. I think she had a degree in geology. She was a wonderful person to work with, and she really held up her part of the job. There's always a lot of office work to be done that we all do, and she was exceptional in that.

Yes, OK. But prior to that, you hadn't had any occasion in all the years to work with women?

I had no occasion to work with a woman.

OK, but in the last ten to fifteen years, that's when you've really seen the change?

Well, I've seen the change come about, yes.

Have you talked to people about women in mining recently? What would you say the attitude is now compared to that comment about being married to someone who knew more than you did, back in the 1930s?

I don't think anybody even thinks about anything like that now. There's just no thought given to that.

It's just an accepted thing?

Yes.

It's an interesting topic, because in talking to some other folks around Silver Peak, they talked about the belief that it was unlucky for a woman to be in underground mines. Had you heard that superstition?

Yes. That was an old, old idea. That was a very old idea. I wouldn't be a bit surprised if it wasn't imported from other countries. I think it came up from South America or Mexico. I believe that idea was imported.

Oh. Why South America? Do you know particularly?

Oh, no. I don't know. Somewhere or other I've heard that superstition mentioned about miners, that they are really worried about women underground.

Underground, that it was unlucky. Did people ever say that to you anywhere along the way?

No, no. It's all hearsay.

Did your wife ever go underground to visit you at any of the mines?

Yes, I guess in some of the properties. Not a working mine, but at some prospects, yes, my wife went underground with me. Anyway, I remember one particular property with quite a long tunnel. We went in with carbide lights, and all of a sudden my wife started getting a headache, and I realized what was happening. She was getting low on oxygen. Those of us who had used carbide lights realized that if carbide lights start giving too much trouble, we were being forewarned that we were running low on oxygen. There's too much carbon dioxide and not enough oxygen. In all underground workings, anything that's rotting is consuming oxygen. Therefore, you go in there, and you're short of oxygen. And that is particularly true in a long tunnel. You go in there, and you start running low on oxygen. You still have to get back out.

Right, so then your wife's headache was a signal.

Yes, it was a signal to get out. Nowadays, they carry little canisters. I forget what they're called, but they're a safety device to give you temporary oxygen.

I see, in case you get yourself in a place where there's not enough oxygen.

Yes. That's right

I was going to ask you another question about women as prospectors. There were some women doing prospecting around Nevada throughout the years. Did you ever meet any of them?

Yes.

Would you tell me about that?

Josie Pearl. [tape paused]

We just got copies of A Mine of Her Own by Sally Zanjani, and in there is a picture of Josie Pearl. Vic, you said that's exactly how you remember her.

That looks like Josie the way I knew her about 1930.

In 1930 you met her? Where?

In the Leonard Creek area. I think it's called Bartlett Creek, actually, near the Leonard Creek Ranch. Norman Annett, his brother Seryl, and I were up there sinking a winze on a pretty fair showing of gold ore in an old prospect. Josie Pearl owned some nearby claims, and she was living up there. And Norman had told me some stories that I doubt now. I'm not sure now whether it's true or not, but he said Josie had been a madam in the Bodie area years ago. Well, keep in mind that here I am—eighteen, nineteen-year-old kid and not very smart, I guess. But anyway, Josie kind of half scared me.

Anyway, I remember so distinctly, one day she showed me a rock. It was a very soft material, and it had what she claimed was gold. I thought to myself, "I'll bet these are brass filings all over the surface of it." And I looked at it kind of curiously.

She said, "Why don't you break it open."

It was a soft material, and I broke it open, and the same stuff was on the inside which was on the outside. So, obviously, it was gold. I was astounded. That was a very fine specimen. Anyway, that's what I remember about Josie Pearl.

She evidently knew her business then, prospecting.

Oh, yes, she knew what she was doing very well. Later on she was a cook at the Montero Ranch at Leonard Creek, which is referred to as Leonard Creek Ranch.

And you were working in that area?

Yes, it was in Bartlett Creek. We pitched a tent there. We were there exactly thirty days, I remember, sinking a winze. And it petered out. At the adit level it was, maybe, eighteen inches wide. At about thirty feet it pinched down to nothing, so we had to chalk that up to experience.

And was that the only time you met Josie?

That's the only time.

What was your impression when you met her? You said you were a little afraid of her. Anything else that you remember? You were young.

Well, my impression was that she was a pretty tough character.

Really.

[laughter] Yes!

Because why?

I don't know. I guess from what I heard and from just talking with her. She was not a sweet, old lady by any means. [laughter]

Can you explain? Can you describe a little bit?

Oh . . . it's difficult to say, but she was factual and down to earth and was not a nice, little, feminine character by any means.

Was she gruff?

Well, not necessarily so. But the circumstances were a little bit odd, because we were leasing ground from a fellow that didn't like her, and she didn't like him. So there was a little conflict there. The ground was being leased from a guy named Guy Bishop, another old character there. It may be that some of the claims—she thought they were hers, and he thought they were his, I don't know. This happens very frequently in situations where probably neither party was doing the assessment work. [laughter]

But you could feel some tension, and it was hard to know where that came from.

Yes, there was a little tension. But as I look back, I think Josie Pearl was OK.

Were you amazed at the time to find a woman out there? Was that surprising to you?

At the time, yes. It was a few years after that, in some of the work I did, I ran into women quite frequently out in the hills—not necessarily prospecting. They were in on ranches. Usually, these women knew their way around and were very helpful.

But was she the only female prospector that you met?

Yes.

So most of the other lone women were . . . ?

They were usually ranchers. Well, later I got acquainted with a well-known lady in the Indian history of the state, Peggy Wheat. Her original name was Peggy Hatton, when I first knew her. And she was very much interested in prospecting.

Did she do prospecting on her own?

I don't think so. She was interested, but she didn't have much time to do it. For one thing, she had about three children. They

were small, and she had her hands full. Later on, she was involved in writing about the Indians.

In Nevada, she did some important work, yes.

Yes, she did.

SAFETY PRACTICES AND LABOR UNIONS

W*E'RE GOING to pick up several odds and ends that we've talked about and not completed. Vic, you had some things to say about safety and mining practices.*

Yes, we had gone into a little detail about the safety regulations and changes in safety and mining, and it occurred to me that one practice of the earlier days was the use of what we called safety fuse. It was used considerably in the explosive industry. In other words, when the miners had drilled a round and loaded it, each hole would have a length of safety fuse attached to it, and they lit these in a certain order.

There was always the danger that a miner would be careless about the timing, and, therefore, he could be caught in a blast that would go off while he was still lighting the fuse. This happened to a friend of mine who was killed in Idaho or Oregon a few years ago. Miners sometimes have a certain contempt for the safety of the fuse, and they think they can determine the timing pretty well in their mind. It's a very dangerous proposition—lighting fuse and not realizing just how fast time is moving along. Safety fuse burns at roughly a foot per minute, and usually fuse is cut in

about six-foot lengths, something like that. That gives the man about six minutes to get the round lit and get out.

There are various ways that miners time themselves. They might have a blank piece of fuse that they light. They start lighting the round, which, say, is five feet long; and when that completely burns itself out, they realize they've got to move *immediately*. They have no more time. That was one of the things miners did, but by and large, it wasn't always so safe. Therefore, the use of safety fuse has now been outlawed, and I think properly so. Nowadays, you have to use an electric device to explode the charge, and although it's a little bit more difficult for the small miner, because it is an added expense, I think it's well worthwhile.

OK, and when you say safety fuse, is that the name of all of this fuse, or is that the name of that five-foot length?

No, that is the name of that particular type of fuse. Fact is, all that type of fuse is called safety fuse. Some of it is white; some of it is black. The black is more waterproof than the white, but it is all somewhat waterproof.

So using this five-foot length as a kind of a timing device was simply a method to alert the miner to get out?

That's exactly right. Yes.

And to keep track of the time?

That's right.

So, you lost at least one friend by an error.

Yes. I know one that's been killed that way, too.

Yes, just losing track of time as they're getting ready to light the fuse.

They just didn't realize how extremely dangerous this is.

That's interesting, to say they didn't realize how dangerous it is, when that's common knowledge. Mining is dangerous, and especially the blasting. And so it's curious to hear you say they just didn't realize.

Maybe, instead of saying they didn't realize, one should say that they had a certain contempt and thought that they could overcome anything. This is very common among men, from the time they are kids until they die. They think they're immortal.

So, they make it through a number of blasts, and then they get to the point where they just think they can't get hurt?

They think it's a very simple operation, and it isn't really so simple. The first thing you know, a man has a little trouble lighting a particular fuse, and it takes him extra time. He's fumbling around with that, and time goes by, and he's in real danger.

Is there anything else on safety practices—changes that you've seen over the years?

This one item came to mind because it happened in the past few years. In a way of speaking, outlawing safety fuse is a hindrance to my work in prospecting and working around a mine, because very often I'll want to shoot some boulders or something like that, and only a few shots with hardly any danger involved. Therefore, not being able to use fuse is a hindrance to me. I would much rather do it that way than fool around with the electric blasting devices. But when you look at the overall picture, I can see the advantage of the electrical system.

And when you say you'd rather use the fuse than fool around with electrical blasting devices, is it because they're time consuming, expensive?

The fuse is so simple. Say, you have one or two shots you want to make, boulders that you're trying to blast. It's so simple—you just split the fuse and light it and walk away. It's a lot different than shooting a round in a mine where you have anywhere from ten to possibly twenty holes to light.

Do you have one of these electrical blasting devices? Do you use them when you're prospecting, or you just don't blast?

Nowadays, I don't have any occasion to blast anymore. When I have had occasion in the last few years, I have used the electrical blasting. Usually, we have a battery around somewhere to set off the charge. Very simple.



You mentioned that when you were growing up your mother had some knowledge about labor unions, and so you had experience on that.

My mother was very sympathetic to labor unions. And as I read various items about labor activities, I could realize why she was sympathetic, too, because there was a time when labor unions were more or less ostracized, and men lost their lives. They lost their liberty, because of their beliefs in labor unions. So I was always rather sympathetic to my mother's ideas on this, and I saw some pretty horrid things in regard to labor strife.

Tell me again what your parents' work was.

My father was a tailor, as was my mother, and the two worked together at home tailoring. In other words, they would work for a larger tailoring company, wherein they would do their part of the work. It was then done at home. It was piecework. I remember, oddly enough, that the principal thing that they did was to make vests. Nowadays, people don't think a great deal of vests, but years back, a suit was not complete without a vest.

And so that was their part of this project?

That was their part. Yes, they made vests. They brought the materials home from the shop where it had been cut and marked, and then they completed making the vest. I remember very often my obligation—when I was available and nobody else was available—was to deliver this to downtown Los Angeles.

As a kid? Because you were pretty young when you lived there.

Yes, I was in my early teens.

So you delivered them to the main tailor. In doing the piece-work, were your parents in a union?

Oh, no, no. They were not involved that way at all in unions, no. They belonged to, I suppose, various general unions, but by that I mean union-conscious groups. But they were not involved in unions as we know unions today.

But they would be considered more like union supporters?

They were definitely union supporters, yes.

You said you saw some situations that were not very pleasant. Can you give me an example?

Yes. I recall a situation in Long Beach, and this would now be, probably, seventy years ago, where the police were trying to break up an assembly of various union-sympathetic families. I saw pictures where the police, for one reason or other, in order to break up the assembly, had thrown boiling water on children. This seems odd. It seems unbelievable, but it did happen. In the frenzy of one group against another, sort of a mob spirit takes over, and people do some very peculiar things. And this was done. I remember that very well. I remember seeing the pictures and heard about the whole thing. That was one of the incidents.

You saw these pictures. Were they in the newspaper or something?

No, they were actually photographs that people who were there had the opportunity to take. They reproduced these pictures, and I got a set of them.

Were these at meetings where your parents were attending?

My parents were not involved. They got this information later from people that were definitely involved. Most of my information on this has come from reading.

But as a youngster, were you afraid for your parents, knowing this kind of thing?

Well, no, I was not particularly afraid. Except my father had a very bad habit sometimes of talking when he should be listening. I remember, in World War I, when there was a terrific craze against the German people. If you recall correctly, we went all out to do some very silly things, such as street names were changed from a German name to something else. And my father was not German by any means. He was Bohemian. I would not say that he was a German sympathizer. He definitely was not. But he didn't like all this hullabaloo against the German people. He made some remarks, I remember, when I was a little kid, that could have led him into trouble. The only reason he did not get into trouble is that he was in the process of taking out his citizenship papers; and, therefore, that would indicate that his heart was in the right place. But anyway, because of this, I was somewhat concerned about my parents. My mother was very logical about all these things, and she was a union sympathizer, but she used good judgment all the way along.

What impact would you say it had on you to be raised in a family where they were sympathetic to unions? Did you end up with the same viewpoint as your parents?

I ended up with the idea that you have to take a broad view of all this, and you have to look at the labor side as well as the operational side, and, therefore, I'm looking at the picture from

the outside. Although I am somewhat sympathetic toward union activities, I also realize that they can also go overboard. And I've seen this. I don't think it's right for a union to try to force membership on an employee. Therefore, that is obviously contrary to what most union people believe in, but I think one has to look at both sides of the picture all of the time. It's not fair to either side to say one is right and the other is wrong.

Did you come in contact with any union activity in your years working in mining, either in Nevada or when you were working for Ford in Michigan?

No, I ran into no union activity whatsoever. There was nothing. I was always involved in very small groups, and I didn't come in contact with any union back there. But from my past, I knew something about it. As an example, many people in this state probably think the IWW [Industrial Workers of the World] was a hindrance to activities in Nevada, but I think the IWW is no different than any other union organization. They're possibly a little bit more radical, but, anyway, they tried to further the interest of the laboring man. Therefore, I could see nothing wrong with what they did.

So, even though you didn't personally come in contact with the union, you were aware of union activities around the state?

There's been very little union activity. All the union activity I know of in the state happened a long time before I got here. It's what I read about.

For example, Goldfield and so on, was much earlier.

That's right. In Goldfield, the governor calling out the National Guard and all that stuff that involved the IWW. In case somebody wants to know, IWW stands for "Industrial Workers of the World," not, "I won't work." [laughter]

Which, I guess, is the common thought, and people make fun of it. Is that right? [laughter]

That's correct. [laughter]

Did you have anything more to say on union activity in Nevada?

No. I know very little about union activities in Nevada, because they all happened when I was so very young, and I wasn't in the state, and I knew nothing about it except what I read now.



OK. Let's change topics then. You mentioned that you did some work surveying dam sites in Nevada. Tell me about that.

Oh, yes. About 1935 I was able to get a job with a small survey crew that was part of the U.S. Geological Survey, in which we were surveying potential dam sites in this part of Nevada. I recall we started in Paradise Valley and did some work along the Little Humboldt River. Then later, we worked on the Carson River. That's about all I can say about it, except that I don't believe any of these dam sites were ever developed.

You did locate some potentially good sites?

Yes, yes, that's right.

Yes, and made some recommendations on them, is that right?

We just made up the maps and left the rest to somebody else. I worked for Fred Roumage, who was a graduate of the Mackay School of Mines, on that particular job.

When you say that they were never developed, since it's 1935, was this part of the extra work that was provided during the Depression years, or was it a project that just kind of dead-ended in some way?

I really don't know. It was not part of the "make work" idea of those days. It could eventually mean something to the state. Why nothing happened, I don't know.

Never did. You were just on the survey crew and then went on to another job?

Oh, yes, I played a small part in the survey.

Your eyes lit up when you started to talk about that, though. Was it something that you enjoyed doing?

It's interesting. I enjoyed the work very much. Of course, I like the outdoors. I learned something from the people I worked with. I greatly admired Fred Roumage, because he was a very tough individual that could work hard and get things accomplished.

What were some of the main things that you learned on that job?

Well, I learned a little bit about surveying in general and what could be done in that type of work. This was plane table surveying, which isn't used much today. That was my first experience with the use of plane table instruments. Later on, I did quite a bit of plane table surveying. When you come right down to it, there aren't a lot of people that understand plane table surveying.

Can you describe it to me?

You have a table out in the field, which is set up level on a tripod, and you make a map as you do your surveying. You're making a map right on that sheet of paper on the table. The instrument you use is called an alidade; it is used in conjunction with stadia methods, whereby you observe and measure your foresights with the alidade and plot this information on the map. Therefore, as you go along, you're actually developing the map right on the paper.

As opposed to other methods?

As opposed to taking notes and then using these notes to plot your result.

I see. And you said you used this later. How did that come to be helpful to you later?

Later on, in my work with the Nevada Bureau of Mines, in conjunction with the U.S. Geological Survey, we studied iron deposits of northern Nevada. In this work, we mapped several iron deposits using the plane table method.

I see. And where was that again?

Well, around Lovelock and also out of Jungo.

And where is Jungo located? That's not a name that I'm familiar with.

Jungo is along the Western Pacific Railroad west of Winnemucca.

West of Winnemucca, OK. So that was helpful to you in mapping iron deposits?

Yes, yes, that's right. Well, we found the iron deposits. We then actually mapped them to indicate the extent of the iron ore.

And was surveying something that you also learned in college, or was that all on-the-job experience for you?

I started learning it in college, but most of it I learned as on-the-job-experience. Incidentally, my surveying knowledge helped me a great deal in later life and frequently provided jobs.

In between mining jobs?

Yes. Surveying was very often handy for me to provide jobs locating or surveying mining claims. In fact, in 1938, while working for the highway department in Carson City, I had some vacation time coming, and I had an opportunity to survey some claims in the Bottle Creek Quicksilver District out of Winnemucca. That job provided me with a check for \$265, and that put me back in school to finish my final year of college at the Mackay School of Mines.

So surveying has just really been important all through your career.

Yes, it was. It meant a lot to me. Also, I was always interested in it. I liked it.

Like that mapping part of it.

Yes. I've been a registered land surveyor for quite a number of years.

What's required to be a registered land surveyor?

You have to have the experience. In my particular case, I had the experience, and the people knew that I had experience, so I was grandfathered, you might say, into this. However, later, while doing some work for Homestake Mining Company, I had occasion to try to retrace a county line in northern California, and I found from the Engineering Registration Department in California that my grandfathered registration in Nevada meant nothing whatsoever to them. I had to take an examination. So I took the land surveyor's examination in Nevada, which, due to reciprocity, gave me an opportunity to also use that certification in California. I recall that when I took this examination I was about sixty-five at that time. And let me tell you, for a man of sixty-five, taking an examination of that type, which is really slanted toward young people, was pretty rough. But I made it. [laughter]

It's more designed for students just coming out of college or something?

Yes, that's right. For people that have not been out of college very long.

Yes, instead of people who have been out working for a lot of years.

Yes.

Did you have to study to take the test?

I studied a lot for that examination.



You've shared with me this University of Nevada bulletin that you wrote on mineral resources of Nye County, Nevada. I'd be interested in talking about this a little bit, because I'd like to ask you some questions about how you came about doing this, what was involved in it, and so on. You did this in what year, 1951?

Yes, I think it was completed in 1951.

OK. And so you were working for the university at that point?

Yes, I was working for Nevada Bureau of Mines, now the Nevada Bureau of Mines and Geology, which is actually part of the university.

OK. And is that unusual for a bureau of mines to be part of the university?

It happens in other states. They're tied together. I'm quite sure in Arizona they tie in. I don't know about California. California may be an entirely separate group.

I see on the cover, Jay Carpenter was the director.

Yes. Jay Carpenter was the director of Nevada Bureau of Mines. He was also the director of the Mackay School of Mines. That was before it became a deanship. This work on the counties did not start with me. I believe it started with a bulletin on Washoe, Storey, and Ormsby County written by Ted Overton. And Jay Carpenter had the idea that he'd like to do this for many of the counties, so he started me out on Nye County. And I was kind of lucky that Jay realized my abilities through writing that I had done for the U.S. Bureau of Mines; and because of this writing experience, why, he felt this would be a good idea for me to study and write up something on Nye County.

What was the writing that you did for the U.S. Bureau of Mines?

I did exploration on some iron ore deposits, also a fluorite deposit, for the U.S. Bureau of Mines, and I wrote the necessary reports of investigation that tied into the study.

So, from that writing, Jay knew that you had the ability to do the writing and to do the research, so he hired you to do this specifically?

Yes. He hired me to work for the Nevada Bureau of Mines, and from the Nye County bulletin. I was going to go on to write something on Esmeralda and Mineral County, but never got to that.

Because?

Well, about that time, Ford Motor Company sent someone out here to investigate iron ore in Nevada, and because of my experience, they contacted me, and I talked to them quite a bit. Then one thing led to another, and they offered me a job later on to look after the Ford Motor Company's mineral interests in the Upper Peninsula of Michigan.

I want to come back to that, because I think that Ford Motor Company experience was important, but let's go back to this geology and mining series. Tell me what process you went

through to gather the information and write this. You said specifically to me that you followed a different angle on this than some others.

My principal interest in writing that resource book on Nye County was to gather all the historic information I could, like the names of people, and to talk to people that were involved, so that this record might be of help to others later on in studying certain mining districts. I frankly think I did a pretty good job. My objective was not to detail geology or anything like that. It was to get a general idea of what was found in that district, and how it occurred, and who did it, so that others later on could benefit by my study.

OK, so you were looking at the county, but also the mining districts within the county?

Oh, yes.

And the products that were found there and who was involved in that?

Yes.

And you also covered in there a lot of detail about the amount of money that was made in some cases.

Oh, yes. I covered production records as best I could. Just everything I could find out about each mining district in Nye County.

Were you in charge of doing the research for this, too, or was the research readily available to you through Bureau of Mines records?

I did the research myself and, yes, I went through everything—all the literature that I could find on these districts—as I went along. Of course, one of the important parts of my research was talking to people, because what information I could get from them

and put on paper was going to be valuable later on, because sooner or later they'd be gone.

So the conversations that you had with people complemented the documents and records?

Oh, very definitely. They complemented everything very well, and they were in addition to what was written in the literature by, for example, Geological Survey geologists.

Did you do a lot of travel to do the research on this? Did you actually go out to Nye County?

I went out into all these mining districts. Oh, yes, yes. I visited the whole area.

So, you visually saw all of them and saw the activity going on, and that's when you visited with the people, too?

Yes, that's correct.

OK, but your documents, your records, were they mostly through the Bureau of Mines, or were there other sources?

Most of the records were actually old U.S. Geological Survey bulletins written by geologists on these districts.

Did you have any conclusions when you came to the end of this project? I mean, an overview of Nye County or a perspective that you could sum up?

My general feeling was that there were still areas that were well worth investigating.

That still had some production values to them?

Yes, they still had some potential, yes. My only regret was that the topographic mapping at the time I did this work was not

as good as it is today. I think I should have gone to a little bit more effort to pinpoint where some of these deposits were. A description of some of the areas there are too general, in fact. I should have gone to more effort to state just exactly where these places were.

It seems to me like you must have known Nye County backwards and forward by the time that you were done with this.

I knew no more about Nye County when I started than I would of Humboldt, Elko, or other counties. I guess I knew a little bit more about Nye County, because, during the war years, I examined mining prospects for the War Department.

Right, so you had already had that experience.

Yes, I'd already had that experience. Most of those, actually, were in Nye County.

Have you followed Nye County production since you wrote the bulletin? Do you keep track of it at all?

Oh, yes. I've watched what's going on. When I talk about Nye County, I'm particularly intrigued with the Round Mountain area, because that was moving ahead when I was there. They used a very novel way of mining and washing gravel there, but later it became very important from the standpoint of hard rock mining.

What was that method?

Well, the method was novel. There was nothing unusual about the washing method, but what was novel was their mining method. They had a way of scraping the gravel from the side of a pit with a large scraper, is all I know to call it, which was pulled up and down with a large drag-line boom. I had never seen it used before or after, that scraper idea.

And working on the sides of the pit?

Yes. Ordinarily, you'd think they would just go down in lifts off the benches and actually mine it with shovels. But in this particular case, I guess, they found out it was very much cheaper to actually scrape it with this scraper, as long as the gravel was loose enough to allow the scraping. There's a pretty good picture of the device in the Nye County bulletin.

OK. I want to see it when we get done with the tape.

Yes, OK.

So was it just the formation in this particular pit that made this a method . . . ?

Yes, it was a semi-consolidated gravel, but it was loose enough so that it could be scraped.

OK, so it was an example of, would you say, an innovation based on what was there to work with?

That's correct. The people, the operators, were smart enough to realize that this would be a much cheaper way of mining that gravel, of detaching it from the wall itself, you might say. Cheaper than using a very expensive shovel to move it.

Do you know who was responsible? What company was working there at that time, do you know? Or who the person might have been who designed that?

I don't know anything about the people involved. Unless I put it in a bulletin, I wouldn't know.

So we'll stop and look afterwards, and see if we can find it, because that's interesting—something different that you saw out there.

Yes.

So you kind of watched that area?

Oh, yes. I did watch the news on the area. It's moved along very well. There's a terrific amount of history on the Round Mountain area, which is only briefly mentioned in my book.

Would you tell me some of it?

Well, I don't know just where it started, but Lou Gordon, who was for many years the secretary or director of the Nevada Mining Association, lived at Round Mountain. He moved that along as best he could for many, many years.

That was kind of his pet project, was it?

Oh, yes. That's what kept him going.

So there was a strong interest in that area?

Oh, yes, yes. For him, particularly. As far as general history, there's very little I can tell you about it, except it goes back a long ways. At first they were mining small stringers that paid off pretty well, but later on they found out that bulk mining paid off better.

And when you were looking at it in 1950, 1951, was it the bulk mining then at that point?

No. You see, what I mentioned about following small stringers and so forth, that's lode mining. In other words, that's mining rock in place. But when I was there, they were mining the placer ground adjacent to the lode deposits. In other words, they were mining the material that was washed away from the lode deposits that were hundreds of feet, probably, above the present surface.

Interesting, rather than the lode itself.

Yes. They were doing very little with the lode mining at that time.

OK. I scanned through this publication, and it's very well written, and it seems very comprehensive to me.

Thank you.

I think it's definitely a work to be proud of. All of the counties were not finished. Is that correct?

Oh, no. I don't think that anything was done by the Nevada Bureau of Mines on counties after this one. There's more of a tendency now to write on the geology of districts, or the geology of a particular county. I went more into the history.

OK. Well, that's interesting to me, based on the project we're working on, which is Nevada mining history through oral history interviews. And what you're saying is that there's lot of documentation of products and so on, but some of the history has not been documented, then, as well as it could be.

I don't think it was. I don't really like the way the U.S. Geological Survey goes at this. I think they could combine the history with the geology very well. But their geologists are not particularly concerned about the people involved, and I was very much concerned with the people involved.

Yes. Why is that?

I don't know. I've known and respected all these geologists very much through the years, but it seems that that's not their objective. Their objective is just the rocks. And my objective was to gather everything I could in regard to history before it died.

Yes, that's important. That's what makes it such an important work. When I first saw it, I thought, "Oh, this is great. If there's one on every county, then we have like a bench mark, you know, of the 1950s."

Yes, that'd be great, if you had it.

If you had it, but that doesn't exist.

No.

I mean, there's probably pieces and parts, if somebody would work to pull some of it together. But a lot of the people would have moved on and be gone by now.

Yes, that's right. Going through all kinds of literature by the Geological Survey, I note that there's no great concern about the people involved. [laughter]

Yes, and yet, there wouldn't be this information if human beings hadn't found it.

That's correct. Yes, I got a lot out of just talking to people.

Yes, and it was through some of this work and your work on iron ore deposits, then, that you ended up with Ford Motor Company.

Yes, that's right. First of all, you see, I drilled some of these iron ore deposits when I was with the U.S. Bureau of Mines, and then I wrote reports of investigation on my results. And then later, I worked for the Nevada Bureau of Mines in cooperation with the Geological Survey on a study of iron ore deposits.

So you had quite a bit of background.

Yes, on iron I did have quite a lot of background.

FORD MOTOR COMPANY
AND HANNA MINING

AND SO, WHEN the Ford Motor representatives came to Nevada, how did they locate you?

Well, of course, when they came to Nevada, the first thing they would probably do is look up what literature was available, and they would run into literature that I wrote. The reason that Ford came out here—and they weren't the only iron ore people that came out here; there were others too—they were looking for what we call a hard-lump ore, which was used in the open-hearth furnace method of converting pig iron to steel. And it so happened that Nevada was a source of high-grade magnetite, which fit their needs just perfectly. Nowadays, the steel industry no longer uses the open-hearth method.

The magnetite is not as valuable for that?

No, it is not. It's good ore, as iron ore, but open-hearth lump ore is no longer used.

So you said Nevada has this resource, and yet, you were hired to go back to Michigan to oversee their resources. Can you tell me more about that job?

Well, what I did in Nevada and what I knew about Nevada iron ore had no connection with what they wanted me to do in Michigan. Ford, old Henry Ford, wanted to be self-sufficient in everything—in iron ore, timber, everything else. Keep in mind that he even bought a lead mine in Idaho, because he wanted lead for batteries. He got involved with rubber plantations in South America for tires. In later years, still following the same general idea, Ford Motor Company wanted to be sure that they were not at someone else's mercy for glass sand, and they sent me out to find a glass sand deposit of their own in case somebody wanted to charge them too much for glass sand. By the way, that's the only ore deposit that I individually found without help from anybody else. [laughter]

And was that in Michigan that you found that?

Oh, no. I found that in Tennessee, I think it was. Well, I found it, because I found out how other people were cleaning up a glass sand which was not just perfect. And using this idea that somebody else had, I found a glass sand deposit that was not perfect the way it was, but required very little washing to make it just exactly what they wanted. So Ford Motor Company, I guess, still owns that glass sand deposit.

And did they use it? Actually use it?

I don't think they had to, because they could buy it from a supplier just as well.

Yes, but they always had that as a backup?

They had it as a club, so that somebody couldn't stick them with the price of glass sand.

So, not only as a backup, but as a negotiating tool.

It was principally a negotiating item, yes.

OK. Interesting. How did you find it? You were watching what other people were doing?

When I knew what could be done, I talked to people and looked in the literature and found out where the proper geologic formations were in certain areas, and I could just go there and look at the material, see it on the ground.

So then, once you located it, Ford Motor Company bought that?

Yes, they bought the glass sand deposit.

You said your job with Ford Motor Company was not just to find the glass sand deposit.

No, my principal work for Ford Motor Company was to look after their mineral rights in the Upper Peninsula of Michigan, and, as I said, old Henry Ford wanted to be self-sufficient in everything, including iron ore. When I first came to the Upper Peninsula of Michigan, Ford Motor Company had recently shut down an underground iron ore mine, because they could buy the ore cheaper than they could produce it themselves. And the mine and its mine buildings and so forth were just surplus to them. I guess my first job was to sell off what I could from this mine, so far as superstructure was concerned of the mine. Then, after that, it was to do what I could to get more details on iron ore on Ford Motor Company lands, and also look after Ford's interests in their partnership agreements with other companies that were mining and beneficiating iron ore.

I came there about the time that the various companies started talking about, or actually working on, what they called taconite, which in Minnesota is a low-grade magnetite. It is ground and beneficiated by magnetic methods to make a higher-grade product. In Michigan, Ford was working with Cleveland-Cliffs Iron

Ore Company to beneficiate a low-grade hematite ore by flotation. This concentrate was later pelletized to make an ideal blast furnace feed.

So the taconite is a low-grade magnetite iron ore in Minnesota?

Magnetite is a magnetic iron ore mineral. Hematite is a non-magnetic iron ore mineral, common in the Upper Peninsula of Michigan. The taconite industry in Minnesota is largely built on the fact that taconite itself is a low-grade magnetite, which is magnetic. Therefore, when ground it can be concentrated magnetically to go from about 25 percent to 60 or more percent iron.

I see. And so your job was to oversee all of these holdings?

Yes, oversee what I could in regard to finding more ore in the Upper Peninsula of Michigan, but also representing Ford Motor Company in looking after these operations in which they were a partner.

So your job was to see that Ford Motor Company got the most for their investment, in addition to looking for new ore deposits. It was important for you to oversee?

Yes, that's right.

OK. Where were all these holdings? Where were all the mines—just in Michigan and Minnesota?

My principal work was in the Upper Peninsula of Michigan with a little in Minnesota. My activity was principally in the Republic/Ishpeming/Negaunee area.

So you didn't have to do a lot of travel. It was all right there.

It was all within a hundred miles.

All right. And were you out in the district quite a bit, or were you mostly in the office overseeing operations?

I was in the district quite a bit, about halftime. The company—more for negotiating purposes than anything else—thought that old Henry Ford's idea of being self-sufficient had merit.

And so his idea had carried on.

Yes.

So does that mean that the actual materials out of the mines were not used by the Ford Motor Company?

When I came into the picture there, I was looking for more iron ore, and I did find some, but that was never mined. These iron ore reserves were probably advantageous from a trading standpoint. They could probably lease these, or enter into some kind of an agreement with Cleveland-Cliffs, as an example, where they would mine them. But none of the additional iron ore that I found was ever actually mined while I was there.

I might also mention about old Henry wanting to be self-sufficient. Remember, the early station-wagon bodies were wooden, and, therefore, they wanted maple hardwood for the station-wagon bodies. That prompted them to build a station-wagon-body plant in Iron Mountain. They had about a half a million acres of forest lands in the Upper Peninsula to draw on for the hardwoods for the station-wagon bodies. Later on, these lands were transferred to the Ford Motor Company Fund. The fund is one of the groups that give money away. Ford Motor Company makes the money, and the fund and the Ford Foundation give it away.

All these holdings eventually came under the foundation?

The timber holdings were given to the Ford Motor Company Fund, but the mineral rights were retained by Ford Motor Company.

So this is interesting in that, while you were working there, you were locating new ore deposits, working on the production of the ore in the mines that existed, and yet, those products were not necessarily used by Ford Motor Company at that time. Is that correct?

The production that was made by companies with which Ford was associated—part of that production did go to Ford Motor Company. Yes, Ford obtained its share, either by purchase or otherwise, but Ford did utilize that product.

OK, because when you first were talking about it, it sounded like the products were not actually used, but were actually a negotiating tool. But that's not entirely accurate?

No, that's not entirely so. In some cases, they were for negotiating purposes; in other cases they were not. But most of Ford Motor Company's activities in the Upper Peninsula were in conjunction with another company. And Ford got its blast furnace feed out of that arrangement.

I see. So what you were doing was very vital to the production of blast furnace feed for Ford's steel plant. How long were you there?

About fifteen years.

How did you like that, compared to what you had done previously?

[laughter] Oh, I much prefer being out in the hills, prospecting and so forth, and dealing directly with people actually in mining. That was an entirely different story. You have to keep in mind that I was the principal employee of Ford Motor Company in the Upper Peninsula of Michigan, and I represented Ford. Therefore, much of my work was really in public relations.

More so than the hands-on kinds of work that you'd done up to that point?

Yes, that's right. I had had no work in public relations whatsoever previous to that, but, somehow or other, I fit into it pretty well.

Yes, maybe that interest in people?

Yes, that's right. That's what it required—interest in people.

Yes, so it was an administrative, public-relations kind of position?

Yes, that's exactly what it was.

OK. Now, has that philosophy for Ford changed, about having all of its own supply sources?

Gradually, it changed. However, it did not change entirely. There are many suppliers competing now so that Ford doesn't have to worry too much about its raw material supply, but it will always keep itself in an assured position. By and large, I think Ford is as self-sufficient as it need be. It doesn't need hardwoods anymore. Glass sand is about the only raw material that could give them problems, but they've taken care of that. Iron ore—there are all kinds of suppliers from whom they can buy iron ore. So they found it to their advantage to work with other companies to assure themselves of having a good blast-furnace feed at a decent price.

You were with Ford during a very interesting time.

A lot of things changed while I was with Ford. This was the period when the concentration of low-grade iron ore to a better product as a blast-furnace feed was being developed. That was very important to me.

Because they could use a lower-grade product?

They could use a lower-grade material to finally end up with an ideal feed to their blast furnaces.

OK, and that whole process was just being developed at that time?

They had been working on this for years before I got there, but the last stages of perfection were developed while I was there.

I see. They were actually having success with it.

I was very fortunate to see that being developed all the way down the line.

Yes. Did that process change the industry then—the mining industry and manufacturing industries?

It changed the industry in that they could get much more production out of the blast furnaces. It changed the industry in that they could make a better product. About the latter part of my stay with Ford Motor Company, we got away from the open-hearth furnaces and are now using what they call an oxygen-lance method to remove the carbon from pig iron and produce steel.

And that made a stronger, better product? Better steel?

Oh, it made much better product, yes. They make much better steel now than they did before.

That must have been exciting, I mean, all way around.

It was. Yes, the death of the open-hearth furnaces and the beginning of the oxygen-lance furnaces, that all happened in the Dearborn area. I didn't see much of it, but I was there during that particular time.

What made you decide to leave the Ford Motor Company?

I always wanted to return to the West. Also, it was no longer feasible for Ford Motor Company to keep an office in the Upper Peninsula of Michigan. There was no need of that, at all. So they decided that the best thing for me to do was to move the office to Dearborn. I had previously spent six months in Dearborn to get better acquainted with Ford Motor Company, and I wanted no part of that. When they gave me the option of early retirement or coming to Dearborn, it took me a split second to say, "I'll take early retirement."

Why didn't you want to be in Dearborn?

Too many people. I don't like large corporations and the way they operate. Although I'm a believer in Ford Motor Company, many of their ideas I just couldn't stomach. You know, in a corporation many feel that you do everything for the benefit of the corporation and forget about the people on the sidelines, and I noticed that. At least, I noticed it in some of the people in Ford Motor Company, and I wanted no part of that. I also, by the way, met some of the finest people I've ever had the occasion to know in Ford Motor Company.

But the change from moving to the Upper Peninsula, where you were sort of on your own and functioning—even though you were part of the corporation then—you had a lot of independence up there.

Yes, I had a lot of independence.

And then, coming back into Dearborn, that would have changed. You would have been right in the corporate structure.

I would be answering to half a dozen people. I didn't like that. Also, I had come back to the West several times, and I decided I could make it again here in the West.

So when you left there, what did you come back here to do?

Well, it didn't turn out that way. [laughter] I had an opportunity to go to work for Hanna Mining Company, and they put me back here in the West. I was with them for six years, I guess. Yes. My first move was to move to Tucson, Arizona. Remember, the Upper Peninsula of Michigan has a relatively cool climate compared to Tucson, Arizona. We moved in March. It was quite a change, climatically. I worked for Hanna for six years. Again, had the opportunity for the early retirement. By that time I had investigated the Reno area and found that I could get along here, so I came back to Reno.

Gave you a chance to come back. And what have you been doing since you've come back to Reno?

Most of it was consulting. [laughter] My first job, though, was a short job with Art Baker, who wanted to have a class in prospecting, and being as how I had done this, he said, "Have at it." And so, I was involved with a prospecting class up at the University of Nevada for a short period.

Was it on campus, or did you travel again?

We traveled into the field somewhat, but most of it was actually on campus.

And that would have been in the 1970s then?

Yes, that was 1976.

And did your prospecting class change from the one you did earlier in your life?

Yes, it was quite a bit different.

What was different?

Well, it was more lecture work, although we did take some field trips. But as Art Baker so aptly put it, "If you know something about mining and prospecting, if you are a prospector, this is not the place for you. This is for those who know nothing about the prospecting whatsoever." And that's what it amounted to. Previously, I had worked with groups where at least half the group knew something about prospecting, and they had claims of their own.

Was it the topic matter that was different? When you're working with people who are already prospecting, I would think that they would know something about it.

Oh, yes. Previously, when I was teaching prospecting classes and working with people who knew something about it, we would have a better rapport between us, talking about what we saw in the field and so forth. Here we were dealing with people that knew practically nothing about prospecting, and, therefore, it was different.

You were really doing the basics.

Very basic, yes.

Were any of the methods that you taught different in the 1970s versus back earlier when you did this?

Yes, earlier, I actually got people to do simple, blow-pipe charcoal analytical work. Now we did nothing like that.

You just taught them basically what to look for.

We taught a little, simple, general geology, you might say.

But earlier you actually familiarized the prospector with mineral specimens.

Oh, yes, taught them how to identify minerals.

But the methods of prospecting had not changed?

Yes, the methods of prospecting had changed quite a bit!

How is that? What's changed?

Well, you have to keep in mind that years ago the prospector relied quite a bit on a pan to identify gold. Nowadays, you're working with a lower-grade material. You're working with gold mineralization that is so fine that you can't pan it, so you have to send it to an assayer. That's all there is to it. Nowadays, you rely more on the general appearance of the rocks and somewhat on mineral associations. You might locate claims in what you think is a good area, and from then on, you turn it over to somebody that knows more about mineral exploration.

You don't pursue it beyond that point?

The old prospector of many years ago really couldn't do very much with what we're dealing with nowadays.

Because in order to get the minerals out now requires a different kind of expertise.

Yes, to identify the minerals may require a different technique. Yes, I remember some of the best prospectors of many years ago relied entirely on a pan. Well, you can't rely on that anymore. It doesn't do you any good.

Yes. All of that is gone. All of that type of gold is gone.

Yes. That method is of little use.

S O THEN YOU TAUGHT, and more recently you've been working as a consultant?

Yes, I did most of my work with Homestake Mining Company.

Homestake is located where?

They just moved. They're somewhere near Wild Waters in Sparks, Nevada.

They're a local company here in Reno?

They're not a local company; they have a local office. They've been in the Reno/Sparks area for many years.

And where are their operations? Where do they work—Homestake?

Well, Homestake Mining Company is principally known for the Homestake Mine at Lead, South Dakota—an old, well-known, underground mine that has had a large production.

Do they have operations here in Nevada, too?

They're beginning to open up an operation near Eureka, Nevada.

And that's a gold mine?

Yes. They have a large operation in northern California . . . well, near Napa Valley. That's the best I can describe it. I believe it's in three different counties there.

And so you've been working with them on these projects, the Eureka and the California?

I worked on that California project doing some surveying and record work.



We are looking at the photo of the operation at Round Mountain that you were talking about. And just so that we can get this onto tape, would you describe that just like you did to me from the picture?

Well, they called it a scarifying drag, and I note here in my bulletin that I said it weighs 7,200 pounds. Well, that's almost four tons. It's about six-by-six or eight-by-eight feet square.

Of metal?

Yes, of steel. And it has large teeth on it, something like the scarifier teeth that are put on a Caterpillar tractor, but probably not that large. And the crane drops it down.

The crane that's sitting up here on the edge of the pit?

Yes, that's right. The crane sitting on the edge of the pit drops it down, or possibly lowers it along the walls, because it'll do some scarifying on the way down. And then, it again pulls it back up, and this scarifier drags on the gravel as it's going upward and cuts the gravel loose. The gravel falls to the bottom and is eventually picked up by a power shovel and loaded into trucks.

And it goes on this conveyor? It's picked up by a shovel?

Yes. The trucks haul it to a central point where it is dumped onto a more or less moveable conveyor about 200 feet long, and that short conveyor dumps it into a bin that feeds the main conveyor. That eventually takes it out of the pit to the plant itself, which is about a half a mile away.

OK, and so this is a process used in open-pit mining, rather than underground?

It's the open-pit mining of gravel in this particular case. Now keep in mind, this is nothing like our open-pit mines in Nevada, now mining gold ore. This is gravel we're talking about, and it's a washing process.

OK, so this is not a process that would be used in mining gold?

This is mining gold. These are gold placers. The gravel is pretty deep there, and it was valuable enough so that by handling large quantities they could make it pay.

And so this process has not been used anywhere else that you knew of because of the type of the material—the gravel?

I don't know where . . . I'm thinking the only other place where it could be used would be in the type of gravels that you have exposed in California in the old hydraulic mines. The cliffs are about the same; you could probably use the same idea. The only problem is, what are you going to do with the tailings? In California you'd have a real problem.

You can see, for example, along the Feather River Canyon between Portola and Quincy, where they did hydraulic mining, those cliffs look the same.

That's correct. They do. They look the same, except that the Round Mountain material may be more consolidated than what we see in the old hydraulic mines. There is no way that I can imagine this method being used for anything except gravel. And if there was some way of disposing of the tailings, they could use it in the California gravels. But in this particular case, we just happen to have a gravel in Nevada and not very much water, but we can handle it. By mining it this way, we could handle it in a plant that requires little water.

OK. Good. That's a good description.

If I recall correctly, years ago they tried to hydraulic some of this same ground in Nevada. I'm not sure.

Before they tried this scarifier?

Many years before they used this. And keep in mind that there are many places in Nevada where hydraulic mining has been used.

Where?

One of them is just below Virginia City in the Gold Hill area. Somewhere in the eastern part of the state they also used hydraulic mining.

That was earlier?

Oh, much earlier.

Before turn of the century, correct?

Yes.

OK. Thank you. We just wanted to get that description down.



Vic, most of your experience has been in exploration. Can you say a little bit more about that?

Yes, sure. My earliest experience in the mineral industry was in underground mining—when I first got involved, you might say, at Ruth, Nevada. But after that, it gradually went over into milling. I was working with cyanidation for quite a while. And then, following that, my experience was almost all in geologic exploration.

Have you seen quite a bit of change in the methods used in exploration over the years?

Yes. Earlier in exploration there was more of a tendency for the geologist or prospector to be sampling actual outcrops and particularly concerned with that. Later on, I found that it became more prevalent to take samples of the chips that were found in the soil, trying to find an anomalous area of mineralization. And also, simultaneously, we took soil samples for the same information.

When you first started to school, that was not the way that you went prospecting. Is that correct?

Yes. About the time I started, in 1928, at that time the prospectors were usually involved in looking at the rock in place. Then later, we also became more involved in the subtle changes in these rocks. We started looking for what we call color anomalies, where the sulfides that are in the rocks change to acid, and the acid, in turn, bleaches the rocks giving us a bleached effect and color, and that gives us a target.

That indicates what?

It indicated that there were sulfides present, and those sulfides could have carried gold or silver, or been associated with other metals such as lead, zinc, or copper.

OK, and you mentioned then that there was one big dramatic change. Can you talk about that?

Yes, I think the dramatic change came about in the early 1930s. And as best I can recall, the Getchell Mine is the best example that I know of, where we suddenly realized that there was a lot of gold present that was not visible and very difficult to find by ordinary panning methods. And so, about that time, we realized that we had to actually assay the materials to find the gold.

So that was the beginning of starting to find gold that was finer than what you could see?

Microscopic gold—what the early prospectors at that time referred to as “no see ’em” gold.

“No see ’em” gold. [laughter] So that’s not recent. I mean, that’s 1930s. A lot of times people talk about the Carlin Trend, for example, with its microscopic gold.

This happened long before the Carlin Trend, and although people usually think about the Carlin Trend being the first important evidence of this microscopic gold, that’s not true. It started before that. Definitely, the Getchell Mine was an example of this. Whether there are other examples or not, I don’t know.

Tell me about the Getchell Mine. Did this happen while you were working there?

Oh, no. I never worked at the Getchell Mine.

OK. But this is the first place that you were aware of this?

Yes, that's right. It's the first time I was aware of this, and I remember being very much interested in the mineralization at the Getchell Mine. That was in the 1930s, I think, is when that property opened up. And that gold definitely had to be assayed. There was no visible gold there. Also, it was tied up in or associated with other minerals.

So it not only had to be assayed, but you had to figure out how to separate all of it.

Yes, that's right. The Getchell Mine was a challenge.

Because of both?

Well, high arsenic content for one thing. If the Getchell Mine was discovered today, we would have to do things a lot differently than they did then. The arsenic ore was first roasted to make it amenable to cyanide extraction. The roasting spread arsenic all over the countryside. I remember so well in that camp, dogs were a rarity, because dogs would get out and get the arsenic on their paws from the ground and then lick their paws, and soon it was the end of the dogs.

Oh. So it was really hard on dogs, wildlife, and so on—the methods that were being used?

Yes, and also, it might have been hard on sheep and cattle, too. I really don't know, but I suppose there was some problem.

And that was at a time when we did not have the environmental controls that we have today?

We had little in the way of environmental control.

Yes. Was there concern about it, do you remember? Was there concern about the environmental impact of that?

Oh, yes. There was concern about the arsenic. And I guess the company did the best they could.

How were you aware of it? Was it publicized, or how did you become aware of the concern about the arsenic?

Well, being in the camp, talking with the mine staff. Fact is, I had a prospecting class there in about 1939 or 1940, and that's when I learned quite a bit about the process. Of course, it was known well before that by people in the mineral industry, particularly by the people right in that area. The general public was not concerned, because they didn't know the details.

What kinds of limits would be put on that mine today, if they found an ore body with that much arsenic in it?

I think that they would have to make provision to remove practically all that arsenic from the fumes before they could be released.

And that's what wasn't done back then—it was just released?

They removed a lot of it, but not enough of it. They tried their best at the time to clean it up, but it was very difficult to do. I just think it would be very, very difficult. Nowadays, we probably have technical abilities that we did not have then to remove the arsenic.

So really, it seems you're saying that as the environmental concerns have increased, so have the technical changes to address them.

Oh, yes. It has to be. In other words, production goes on, and you've got to figure out some way to keep going.

Yes. Can you give an example of your observation of how environmental concerns have changed operational methods?

No, I really can't give you a definite point right now. I do know that there was a time when we used rather simple, but not entirely efficient, ways to remove unwanted materials out of fumes. Later, we developed more efficient electrostatic methods to remove these materials. I don't know just when that happened. It was pretty early.

Yes, so that was one of the ways that you remember cleaning fumes that were going into the atmosphere.

Yes, it was a matter of technology improvement.

After your first years in mining and milling, most of your focus has been in the mineral exploration.

Oh, yes. Ever since just before World War II. I guess it was about the time that I started teaching prospecting classes. From then on, I worked principally in exploration.

And we talked last time about the exploration that you did before the Ford Motor Company; but then, when you came back to Nevada, you've worked as a consultant. Are you still doing mineral exploration?

Yes, I was in exploration; and, of course, I was somewhat involved in record-search work, too. They're all related.

Can you give me some examples or tell me a little bit about your work now, because you're continuing to work, correct?

Well, about fifteen years ago or so, a group of us got together and formed a small company to look for areas that we felt had mineral potential. That developed into what became known as VEK Associates, and it was started by Ralph Roberts, Bob Reeves, and myself.

And so, the work that you've been doing with this group is what?

Well, we located a lot of claims; and, of course, we leased these claims out. And much of my work has been involved in watching these leases and taking care of the necessary paperwork. Actually, I have not done much geologic fieldwork in quite a number of years.

Did you do any exploration work at all when you came back to Nevada?

Oh, yes, I did. I did a little exploration and associated work for Homestake Mining on a consultant basis. And, of course, when we formed this little company about fifteen, sixteen years ago, all my work was in exploration. We were actually out in the field sampling and doing a little drilling here and there, and doing some geophysical work.

In your company, that was where you did the exploration, set up the claims, and then leased those out?

That's right. We did preliminary exploration on the claims that we had located, and, if we had any encouragement, we went on from there. Of course, we simultaneously had to get a little extra money for that work, and we brought in a man in the oil business for whom I had done some consulting work in the past, and he supplied the money for this. Therefore, the organization really became VEK/Andrus Associates.

OK, because Andrus is the person that came in to help?

He came in to supply the financial help we needed.

What's his first name?

Bill.

And so, after you did the preliminary exploration, the money was used to start developing the claims?

No, the money was used to do more extensive preliminary exploration. We didn't have the money to do extensive drilling.

Then what's the process after that?

Well, after our preliminary drilling, if we had had some encouragement, there was usually somebody around that was very willing to lease the claims to continue the exploration. And that finally resulted in the Marigold Mine out of Valmy.

OK. Tell me about that mine.

Well, the Marigold Mine operated . . . well, it's still operating on a small basis. That was a pretty good producer for about ten years or so.

And is that gold?

Yes, it's strictly gold. It's an open-pit operation. We got involved in that, because we knew about the old Marigold where Frank Horton had made a little money. And in that vicinity the geology was such that Ralph Roberts felt that the lower plate rocks, which was our geologic objective, were not far from the surface. And we did a little geophysical work there that confirmed that this was the case. So we drilled that, had a little encouragement, and then felt that maybe we could do better by getting a little bit closer to the old Marigold, so we asked the driller to move down the road closer to the old Marigold. The roads were in pretty bad shape because of wet weather, so he just stopped where he had to and put down a hole, and we got quite encouraging results. Simultaneously, Andy Wallace of Cordex was in that area and was interested. He immediately leased that ground from us, which finally resulted in the Marigold Mine. Oddly enough, that particular hole, which started all the excitement, you might say, to date has not developed into an ore body.

Really?

In the drilling around there, Andy found the ore body itself that made the Marigold Mine, but it was not tied to the hole that started the activity there.

Interesting. And if the roads hadn't been bad, would he have been able to go further and missed that point?

Could be. He wouldn't have gone much farther, because we definitely didn't want him to get right up to the property boundary. I don't believe in drilling on a property boundary, because you're drilling for the other fellow, too. So he could have gone a little bit closer to the other property, but a lot of luck was involved.

That's what I was getting at, because of all of the old stories about, you know, Jim Butler throwing a rock at his mule and those stories, where it was just luck that they found certain claims. And was that kind of the case in this, the bad weather and everything?

Any geologist knows now that luck is a very important factor in finding an ore deposit. [laughter]

Yes, yes. Because there's all these stories, and this one fits in, I think.

Oddly enough, after that first hole that gave us our encouragement, we moved somewhat closer to the boundary, but off to the east as well, and put down another hole, and it was almost a blank. It had a little bit of gold, but not very much.

So that could have been pretty discouraging.

Yes. If that hole had been our second one, we might not have done anything about it.

Right.

In summation, a lot of that is luck. Sure, it started with geologic reasoning and followed with geophysical confirmation, which resulted in the first holes, which gave us a little interest.

Yes, but from there it was the bad weather and the bad roads.

The second hole was put down because the driller just couldn't go any farther.

When you say geophysical work, would you define that for me?

In this particular case, we're using simple seismic methods to determine where the thrust fault was shallow. It was not very deep. We wanted the rocks below the thrust fault. Our endeavor was to sample those rocks below the thrust fault, which we did.

You said that Andy Wallace was in this area, and he was with Cordex, and he leased the property?

Yes, Andy Wallace, who is the manager of exploration for Cordex, was in there, and they realized the importance.

How good a producer has this mine been?

I believe that mine has produced in the neighborhood of about \$70 million in gold.

So that's one of the better ones in Nevada then, is that right?

K: Well, it's a smaller one. It's extremely small, considering what has been done on the Carlin Trend.

And how close is that to the Carlin fault? That's fairly close, is it?

Oh, no. The Marigold must be about sixty miles west of the Carlin Trend.

Oh. Yes, it's not close then, not in geologic terms. [laughter] It's not close.

Well, the Carlin Trend is north of Carlin, and this is south of Valmy. Well, maybe it's not quite sixty miles. Well, pretty close—fifty, sixty miles west of the Carlin Trend.

And the Marigold, was this also the microscopic gold?

Oh, yes, very definitely. Yes, it's microscopic gold.

Do leases today work similar to what they did back in the 1930s? Because I know when we talked about Silver Peak, there was a lot of leasing of the mines and so on at Silver Peak. Is it structured the same way?

No, those smaller leases, like Silver Peak—I think there we were talking about individuals leasing ground and taking out the ore and shipping it to a mill. This is an entirely different matter. Here, you lease the whole property; and then the operator, who is the lessee, does further exploration, develops an ore body, sets up a mill, and mines that ore body, and pays a royalty to the property owner. Leasing of that sort is a pretty major scale as compared with the individual leasers.

In one Silver Peak mine they had just a certain amount of feet that they could work.

Yes, correct.

When you found this, was the property yours, or is it a claim on the property?

We located a lot of claims there, and we were also checker-boarded in that area, checker-boarded with the railroad. So when Cordex came into the picture, they had to work out an arrangement where they also had control of some of the railroad land, so they had to make arrangements with the railroad.

When you say checker-boarded, are you just describing that the railroad owned some of the land?

Every other section.

And so the person or company who leases has to work that out?

Yes, they probably want some control of adjacent railroad land, because they don't know the extremities of the ore body. So that's the reason that the railroad gets into the picture.

The VEK/Andrus Associates—has the Marigold been its main project, or are there others?

We have some claims just north of the Barrick and Newmont operations; and, there again, Cordex had a lease, and a small ore body was taken out near the surface. However, that is now leased by Homestake and others. Actually, it's leased by Homestake, who is working in a joint venture with another company. The exploration there requires deep drilling that is around 2,000 feet. This has resulted in some pretty good gold intercepts, but the project will require much more drilling. But the present operators are confident that by re-examining all the drilling results and geologic information they can properly plan further drilling. At this time the company is setting up a new drilling program.

So that's looking very hopeful.

Yes, that's a pretty good potential. It's extremely good real estate. It's in the right place. We just hope there's an ore body there.

And just hope to find it? [laughter]

Yes.

Do you get out to the properties very much, or is most of your work just the paperwork for the company?

I seldom go into the field on these properties. There's no need of going. There's nothing to see out there that I don't already know about.

Yes. Describe more about what your job is for the company. You said the paperwork?

Well, since the death of Bob Reeves, I'm acting as secretary-treasurer, so that means I watch the royalties and see that they are properly distributed and keep a close eye on the leases. I'm also involved with a small company called Frazer Creek Mining Company, which has claims in the Midas area and also in the Buckskin area north of Winnemucca.

And what's your role with that company?

I'm secretary-treasurer of that, too. There isn't very much to be done in my part there, but once in a while I do get out in the field. I'm involved with two others on that, Bob Hatch and Ken Jones. We invested some of our own money in that some time ago. We drilled one of the properties and found some pretty good gold intercepts. As we don't have the finances to do much drilling, we're just in the process of leasing these properties out to a company that has drilling plans.

What part of all of this do you like the best? It seems like you are of retirement age, and you could be doing nothing at this point, but you're still very much involved.

Well, I'd like to spend more time in the field, principally, to use some of my own exploration ideas.

What are some of your ideas?

About thirty or forty years ago, I was introduced to a soil geochemical testing idea, which is sometimes referred to as the "Bloom method." It's also referred to as "heavy metals field testing," whereby a simple kit is used to detect zinc, lead, and copper

in the soil. My personal opinion is that almost all ore deposits have some zinc associated with them. Zinc is the one element that's picked up easiest by this method. Therefore, if you test soil samples in the field, you can immediately outline an anomalous area that may well be worth drilling.

So that's most exciting to you?

That's something that's very exciting to me, but not necessarily to some of my associates. That makes no difference to me. We also have other ideas that we can kick back and forth among ourselves.

Yes, but you can get out from time to time and try this method?

Yes, that's right. I also have used this method to help people with whom I'm otherwise associated, to give them a better idea of what they might have on their property.

Is that some of the consulting work that you do?

No. As an example, I have a druggist friend, who has some mining claims. And so, what I do is, I help him with prospecting, and he helps me with my medications. [laughter]

A trade situation, right?

Yes!

That's a good idea. [laughter] So you've been staying really active and involved in mining.

Yes.

It's not something that you're ready to give up, are you?

Not very soon, not by any means. I want to keep at it as long as I can. My formula of keeping alive is to keep your foot in the door, so far as your work is concerned. Yes.

Yes, keep active and interested.

Absolutely.

Mining is also something—from what I can see in talking to people—kind of gets in your blood, does it?

Oh, yes, it does.

People get hooked on it?

Yes. Oh, I recently purchased a metal detector, with which I'm going to do a little fooling around. But that's a whole new field. I've got to learn something about that. [laughter]

So you're striking off into a new area, besides.

Somewhat, yes.

You mentioned Homestake, and I wanted to find out a little bit more about the work that you've done with and for Homestake.

Well, I did a lot of varied consulting work for them, from searching records, to surveying, to examining prospects.

And are you still working with them?

No.

That was a past job that you did?

Yes, that's in the past. That stopped quite a long time ago. I keep in touch with them. After all, they're very much involved with one of our properties that we, and they, think has potential.

And which one is that?

That's the one that's just adjacent to the Newmont and Barrick operations on the Carlin Trend.

Oh, OK. So you're leasing to them?

Yes, it is leased to them. Yes, that is all the connection.

We talked about the fact that early in the 1930s there were a lot of people who did prospecting to supplement their income on through the 1940s and so on, and whether that's possible anymore. Would you talk a little about that, because you have some experience with that, from your prospecting classes and on up into the present?

Yes, I found that there were early-day prospectors in the 1930s, who would spend their extra time in the hills looking for some potential ore deposit, and they might find something that might have some potential. They would contact a company that would, in turn, continue that exploration and pay these people a small advance royalty, and this would supplement their income. Nowadays, it's so costly to do this exploration. Analytical work costs money, and it's difficult for an individual to do this like they used to do in the 1930s.

You said that the assaying is costly. Could you give me an idea of what that would be?

If it is just a few samples, say, ten samples or something like that, you're facing something close to a hundred-dollar cost. The average individual can't support that.

Because you would do more than ten samples.

Oh, yes. Yes.

You would do more like, how many for an area?

Well, your preliminary work would end up to about ten, but if you did any follow-up work, pretty soon you're getting into at least twenty, thirty samples or something like that.

Yes, so the cost goes up pretty fast. You've got to have a way to pay for that.

Yes, that's right.

So it's just not done as much anymore?

No, the individual doesn't do very much of that.

Yes, so it's more effective the way you're doing it; that is, joining with others to spread out the cost.

Yes. Individual geologists often cooperate with each other to strengthen their ability. However, we were unique in putting together geologists and engineers into small corporations—to spread out the cost, as well as being more versatile.

So that's not something just you have done? Other people have done something similar?

I think there are others doing something similar—an association of a couple or three consulting geologists, who are simultaneously looking for properties or ground that they might turn over to a company for additional exploration.

I see. So, is it a matter of consultants helping to fund their own exploration?

Yes, they've got to have funding somewhere. So these people, who join together into an association, or whatever they want to call it, have to do something to bring in some money, and usually it's consulting.

*Yes. The old concept of the grubstake, only modernized?
[laughter]*

Yes, that's right. It's modernized considerably and yet somewhat similar. The grubstake idea, where someone pays for the prospector's food and in turn gets an interest in whatever is found. I don't know if that's done very much anymore. I don't think it is. However, in the case of VEK Associates, Andrus paid the actual exploration bill, and VEK supplied the know-how. This resulted in a partnership, VEK/Andrus Associates. Different, but similar.

The early grubstake idea was still used in the 1930s. I worked on a property in about 1930 where an individual grubstaked us by supplying our food and supplies; and they, in turn, would have a definite interest in whatever we found.

Now it's usually a matter of each exploration group basically grubstaking themselves by their consulting work.

Yes, they do. There may be companies that are grubstaking prospectors or geologists, but I don't know of them, and I doubt that they do.

So when you're out prospecting, there's always the excitement of the next find, isn't there?

Oh, yes. You can't say we've found it all by any means. No. No matter who you talk to, whether a layman or otherwise, they'll usually say, "Well, it's been so successful in the past, I don't see why there can't be some ore left." [laughter]

It's always that hope.

Yes, that's right.

It's interesting, in some of the things that I've read, there are predictions that there will be an end to our resources in Nevada. There just won't be any more gold, and all the miners will go to South America or Africa or something.

[laughter] You'd have to have a pretty good crystal ball to say when we're going to run out, because it's been going for quite a while. There's an awful lot of territory involved. And there probably will be new methods developed that will make it easier to find ore, so now it's pretty hard to say when we're eventually going to run out.

Do you believe in those predictions personally? Do you believe in those that say, "Twenty years, it'll all be over?"

Oh, no, not at all. I remember years ago when I was in school studying oil, and all kinds of predictions were made that we'd be out of oil in twenty years or something like that. We've got far more oil in the United States now than we had at that time. So they keep working and keep finding more.

OK. That's all the questions I have for today. Is there anything else that you would like to cover that we maybe haven't?

When we first came up with the idea of some of us pooling our knowledge and forming a company and locating claims in favorable areas, it was Bob Reeves, who is now deceased, who came up with that idea and should be given full credit for the thought that the three of us, who had been involved in Nevada for so long—that it'd be well worthwhile to pool our knowledge and see what we could do.

And work together, because you all had a really good understanding of the state.

Yes. Ralph Roberts was probably more knowledgeable by far on the geology of Nevada, but it also took the plain, good horse sense of exploration to move this thing ahead.

Yes, so it's been a good threesome to work with. Now you said Bob Reeves passed away. When did he die?

It must have been in December of 1995, I guess.

Oh, really. So you've had the company that long?

Oh, the company has been operating since about 1981.

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